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HEALTH INEQUALITIES

IN THE CITY OF TORONTO

TECHNICAL REPORT

Community Health Information Section
Department of Public Health
City of Toronto

January 1991

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EXECUTIVE SUMMARY

This report is about inequality and equity. It is primarily about inequality because it presents the results of new research showing that some people in the City of Toronto live longer than others, and some people suffer more than others from sickness and disability. It is also about equity because these same data suggest that the differences in health status occur because of differences in living conditions: some people have more opportunity than others to enjoy good health.

The City of Toronto Department of Public Health has a long history of research and advocacy in this area, beginning with the The Unequal Society, a landmark report that was prepared in collaboration with the City's Planning and Development Department. A succession of health status reports and annual statements issued by the Medical Officer of Health have documented differences in the health status of residents of the four Health Areas. This work culminated in a requirement in the Board of Health's report on Healthy Toronto 2000 for a detailed report on health inequalities.

Three new studies form the basis of this report. They were undertaken under the auspices of the Department's Workgroup on Advocacy for the Basic Prerequisites for Health and their purpose was two-fold: to assess the extent of inequalities in health status in the City of Toronto using the Department's substantial files of vital statistics and community health survey data; and to assess whether existing data, methods and indicators are appropriate for the study of health inequalities.

The research is set in the context of the public policy debate about whether improvements in the health of Canadians require continued economic growth or more equitable distribution of wealth. Substantial international literature suggests that once a country achieves a certain standard of living, overall health status will only improve when the opportunities for health are equitably distributed.

For the field of public health, this requires a new way of thinking about health. This "socioenvironmental approach" incorporates both the medical model, and the behavioural approach that currently dominates thinking in the field. It directs our attention to physiological, behavioural and psychosocial risk factors as well as to socioenvironmental risk conditions such as poverty, low levels of education and occupational status, inadequate housing, lack of access to nutritious food, discrimination and linguistic or cultural

barriers to health. The distinction between risk factors and risk conditions is important: it suggests that while risk factors are, theoretically at least, within the power of an individual to change, risk conditions require change at the societal level.

We attempted to address several risk conditions in the three studies. Two of the studies used mortality data for the period 1984-88 and the third study used data from the Toronto Community Health Surveys that were conducted in 1983 and 1988.

In the first study, we used data on country of birth for more than 25,000 City of Toronto residents who died during the five-year study period to calculate age-standardized, country-specific mortality rates for men and women for all of the major categories of disease and for several specific causes of death. The ten countries or regions of birth for which we were able to calculate rates were Canada, United States, United Kingdom, Greece, Italy, Portugal, other European countries, Caribbean, Hong Kong, China and Taiwan, and other Asian countries. When we compared these mortality rates, we found that they were consistently higher for Canadian-born Toronto residents. The major exception was Toronto residents born in the United Kingdom, whose mortality experience was similar to that of Canadian-born residents.

These results are consistent with the substantial literature on migrant mortality, but it is not possible to say from any of these studies whether lower migrant mortality rates are due to ethnocultural differences, the experience of immigration or, more likely, to some combination of these factors and conditions. What we need now are studies that focus on specific health issues in specific ethnocultural groups. If some cultural values and practices are health enhancing or health protective, it is important to learn from them. If specific ethnocultural groups are health disadvantaged, we need to learn about their needs.

The second study was an ecological analysis of mortality. Using age-standardized, sex-specific mortality rates for City of Toronto census tracts, we found an association between poverty and mortality that is consistent with the results of other Canadian research. We then looked at whether mortality rates in census tracts were associated with levels of education or occupational status in the area, and whether the

proportion of residents with non-English or French first languages[1] made any difference. For many of the causes of death that we studied, the association between poverty and health was strengthened when we controlled for these other variables: the results suggest that the effects of poverty on health may be most severe in predominantly anglophone areas with low socioeconomic status. We also found that level of education was more important than poverty as a predictor of mortality rates for women, most notably for circulatory disease.

Ecological analyses must be interpreted cautiously because they refer to associations at the census tract level, rather than at the individual level, but they are a useful starting point for research on health inequalities. This study suggests that some neighbourhoods in Toronto may not be healthy social environments, and yet a closer look at those neighbourhoods might reveal their capacity to enhance the health of their residents, if only that capacity can be harnessed. What we need now are studies of particular neighbourhoods or communities and of the interplay there of physiological, behavioral and psychosocial risk factors and socioenvironmental risk conditions.

The third study used data from the Toronto Community Health Surveys (TCHS) of 1983 and 1988. A random sample of nearly 1,000 residents were interviewed by telephone in each of the surveys. They were asked several questions about their health status and risk factors and a few questions about risk conditions. Both surveys tended to underrepresent health disadvantaged sectors of the population, however, especially TCHS 1988.

Despite the limitations of the study, we found evidence of inequalities in activity limitation in TCHS 1983 and TCHS 1988 and in reported chronic health conditions in TCHS 83. Age, sex, smoking behaviour and income were associated with activity limitation in TCHS 1983, for example. The association between activity limitation and each of these factors and conditions persisted even when we controlled for all of the others. As income levels decreased, activity limitation increased, for both men and women, in all age groups, among smokers, former smokers and respondents who had never smoked.

The pattern for the chronic conditions outcome was not so clear, however. While there was a wealth of bivariate

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[1] - "Mother tongue" is standard usage in the census and social research literature, however, we will use the term "first language" throughout this report whereever mother tongue would have applied.

associations between health status outcomes and each of the risk factor and risk conditions variables, few of these associations persisted when we controlled for all of the other variables. We conclude that it is very difficult and not very efficient to collect the data necessary to address health inequalities with general population surveys at the local level. The emphasis in the future at the local level should be on well-designed small-scale studies that focus on specific groups or issues, using the "appropriate technology."

The results of all three studies point to the existence of health inequalities in the City of Toronto. But the limitations in the data and methods of each study make it very difficult to directly assess the nature and extent of these inequalities. We can say with some certainty, however, that there are inequalities in death from diseases of the circulatory system, including heart attack and other ischemic heart disease. Although there has been a dramatic reduction in death from these diseases over the past decade, they still account for nearly 40 percent of deaths in the City of Toronto. These results suggest that a focus on risk conditions such as poverty, as well as behavioural risk factors, could further reduce mortality from cardiovascular disease.

The results are less clear for other chronic health conditions, but there is some evidence that diabetes, lung cancer, respiratory diseases, accidents and injuries--especially suicide, and diseases of the digestive system may also be sensitive to risk conditions.

The Department of Public Health can play an important role in helping to put research on health inequalities and health equity on to the agenda of other levels of government, research institutes, universities and community agencies and groups. The DPH can work with them to develop a coordinated research strategy and should undertake a formal consultation with these parties in order to define its own role in future research on health inequalities.

While a great deal more work needs to be done in this area, we know enough already to be clear about some of the implications for public policy. When our results are set alongside other Canadian and international studies, there is compelling evidence of the existence in inequalities in health and inequities in access to the basic prerequisites for health. We do **not** need more health care spending to create more health; we do **not** need more economic growth to create more health; but we **do** need more economic equity to create more health. All levels of government should review their economic, fiscal and social policies to ensure that they are health protecting and health promoting and the Department of

Public Health, with support from the Board of Health, should advocate for the appropriate changes in these policies.

Despite having a large foreign-born population whose mortality rates tend to be relatively low, the City of Toronto has a higher mortality rate, overall, than either Ontario or Canada. The most effective way to close this gap may be to reduce poverty in the City of Toronto.

RECOMMENDATIONS

1. That the Department of Public Health undertake a formal consultation with research institutes, universities and interested community groups on the Department's future role in research on health inequalities and health equity, and that a Department report be prepared with recommendations for any changes in policies and procedures that may be required.

2. That City Council request the provincial government review the relative contributions to health that could be achieved by reducing poverty, unemployment and lack of education, as compared with further investment in a curative health care system.

3. That the Board of Health and City Council advocate that municipal, provincial and federal governments review their economic, fiscal and social policies to ensure that they are health protecting and health promoting.

4. That the Board of Health widely distribute the Summary Report of Health Inequalities in the City of Toronto with the recommendation that it be used to advocate for changes in public policy at all levels of government.

CHAPTER ONE

HEALTH INEQUALITY AND HEALTH EQUITY

1.0 HEALTH INEQUALITY AND HEALTH EQUITY

1.1 Introduction

This report is about inequality and equity. It is primarily about inequality because it presents the results of new research showing that some people in the City of Toronto live longer than others, and some people suffer more than others from sickness and disability. It is also about equity because these same data suggest that the differences in health status occur because of differences in living conditions: some people have more opportunity than others to enjoy good health. In short, "inequalities in health status are the result of inequities in life" (Draper, 1989).

This concern with health equity is not new, in fact one can argue that it is the historical basis for public health as a discipline. But there has been a renewed emphasis on equity in recent years. This concern is reflected in the World Health Organization (WHO) goal of Health For All and in the WHO European Region's first target, which is concerned explicitly with equity (WHO, 1985). In the United States it is reflected by increased emphasis on improving the health of minorities. The failure to meet 1990 health objectives for the U.S. is recognized as being caused in large part by a failure to close the gap between general population and minority health (Mason, 1989).

In Canada, the renewed emphasis on health equity is evident in the new health promotion framework (Health and Welfare, 1986; WHO Europe, 1986) and in several key provincial health planning documents (Ontario, 1987a, 1987b, 1987c). In Toronto, the Board of Health's strategic planning document Healthy Toronto 2000 (City of Toronto, 1988), and the priority given to advocacy for the basic prerequisites for health by the Department of Public Health and the Board also reflect this concern with health equity.

The Department of Public Health has a long history of advocacy for the basic prerequisites for health (MacDougall, 1990). In May 1989, it was formally identified as one of six departmental priorities and the Workgroup on Advocacy for the Basic Prerequisites for Health (ABPH) was established and given a mandate to develop a plan for increasing activity in this important area.

The first step in that plan was to undertake research on inequalities in health status, specifically, to investigate the link between health status and basic prerequisites such as an adequate income. The objective was to exploit existing data as fully as possible, to see how much they could tell us about

inequalities in health status and, by implication, health equity. We also wanted to determine the limitations of existing data, to see what they cannot tell us about health inequalities, so that we could begin to develop a research agenda for the future.

The research was conducted in tandem with the ABPH Workgroup's effort to develop a theoretical framework that could guide practice in all spheres of DPH activity. This report is based on both the research and the theoretical framework that was developed by the Workgroup.

Health equity becomes a concern whenever it can be demonstrated that inequalities in health status are caused by inequalities in people's socioeconomic and physical environment, because these are conditions that can be changed. The next section reviews some of the literature on health inequalities and describe some of the public policy approaches that can be taken to address health equity issues. This discussion establishes the public policy context for the research that makes up the bulk of this report.

The remainder of this chapter describes the theoretical framework that has guided our research on health inequalities and introduce the three studies that are the basis for this report.

1.2 Health Equity and Public Policy

Equity means fairness. It is an ethical and political concept, about what "ought" to be rather than what "is." Health equity means that fairness ought to exist in people's access to health. This is a broad statement, particularly since access to health is not the same nor as simple as access to health care (Evans and Stoddart, 1990).

A person's health may be influenced by many aspects of their social circumstances such as their income, education, occupation, exposure to health hazards, and personal lifetyle. Section 1.3 describes how these circumstances interrelate with each other to produce disease and premature death. In this section, we discuss the policy implications of research that show how unequal access to the opportunities for health affects health status.

Equality means sameness. It is different from equity and, with respect to conventional measures of health status such as lifespan and disease, can never be achieved. Differences in family history, genetic predispositions and life circumstances will always exist. However, there are many aspects of our social circumstances that are modifiable, and that can be changed to increase health equity and so reduce health inequalities. Social circumstances can be altered to increase the degree of fairness in access to the opportunities for health.

1.2.1 Socioeconomic Status and Health Status

Our social circumstances are usually defined by our sex, age, ethnocultural background, where and how we live, and our general socioeconomic status (SES). In Canada, as in other wealthy countries, women tend to outlive men, which probably arises from a combination of differences in personal lifestyles, occupational risks, acculturated risk-taking behaviours and, possibly, genetic gender differences. In all countries, older people are more likely to experience disease or to die, a natural result of biological aging.

But not all women outlive men, nor do all women live equally long and healthy lives, nor do all older people share the same experience of disease or risk of death. Where and how we live (exposure to hazards, personal behaviours) influences our risk, but the greatest influence may be our socioeconomic status (SES).

Differences in SES are usually measured by looking at a person's income, education level, or occupation. These three measures are interrelated strongly. The Canadian poverty rate, for example, is much higher among people with primary school education than among those with university degrees. Some researchers claim that education is the most reliable measure of SES (Millar and Wigle, 1986), though this does not mean that a person can simply learn their way into better income, fairness or health. European research consistently points to occupational status as a more reliable measure, arguing that work is intrinsic to income and a major source of self-concept, self-definition and social networking (WHO Europe, 1984). Most Canadian and American research uses income levels as an SES marker.

Wilkins and Adams (1983) provide the most comprehensive Canadian account of health status by SES. Using census mortality and income data (Wigle and Mao, 1980) and information from the 1981 Canada Health Survey, Wilkins and Adams concluded that there was a quality of life differential between poorest and most affluent income quintiles of 7.7 years.

Quality of life, as they measured it, included age at death, severity of physical disabilities in later years, and number of years of disability prior to death. Income quintiles are categories researchers use to compare the health of the most affluent 20 percent (quintile, or fifth) of the population with the health of people whose incomes put them into the poorest 20 percent of the population.

Canadians in the poorest income quintile, particularly males, experienced significantly shorter lifespans and more years of serious physical disability. The gap in life expectancy by income quintiles has decreased slightly in the past decade, but this

reflects gains made earlier in life. At age 60, the life expectancy gap between upper and lower income quintiles widened between 1971 and 1984 for both men and women (D'Arcy, 1989).

The Canada Health Survey (Statistics Canada, 1981) also found strong income-related differences in the rates for most diseases, including hypertension and heart disease. People in the poorest income quintile were almost twice as likely to report these conditions as people in the most affluent income quintile.

The 1985 Canada Health Promotion Survey used all three measures of SES. Only 20 percent of persons with elementary or less education reported excellent health, compared with 33 percent of persons with a university education. Conversely 27 percent of persons with elementary education or less reported fair or poor health compared with only six percent of persons with university education.

Occupational status showed similar, though less dramatic, gradients between professional, white and blue collar workers; unemployed persons fared worst of all. The same gradient existed with income, with almost 30 percent of the most affluent quintile reporting excellent health compared to only 17 percent of the poorest quintile. Conversely, only 4 percent of the most affluent quintile reported fair or poor health, compared to 30 percent of the poorest quintile (Wilkins, 1988).

Data from other countries indicate similar differences in life expectancy, death and disease rates (Marmot and McDowall, 1986; Kraus et al., 1980; WHO Europe, 1984; Wilkinson, 1986). Recent United Kingdom studies note that the "health gap" between upper and lower occupational classes is widening, especially for heart disease among males (Smith, 1990).

Part of this health difference comes from a greater prevalence among lower SES groups of known individual risk factors, for example, smoking, poor diet, lack of exercise, elevated blood cholesterol and high blood pressure (Labonte, 1990a; Millar and Wigle, 1986; McIntyre, 1986). This does not mean that changing specific risk factors will eliminate inequalities in health status, however. Deaths due to specific diseases and their particular risk factors change over time.

Several decades ago, the poor died more frequently than the affluent from infectious disease. Today, they die more frequently from heart disease or from some cancers, but less frequently from other cancers. Similarly, lower SES groups in different countries die from different causes (Smith, Bartley and Blane, 1990).

A disease or risk-factor specific approach to reducing inequalities in health status is important, but it will not be

entirely successful. One disease inequality will merely be replaced by another. Smoking rates, today's single leading cause of disease and premature death, were once higher amongst higher SES groups, yet lower SES groups still had more disease and premature death. Over time, and across nations, the poor appear to be more vulnerable to most diseases, regardless of their specific causes or risk factors.

What accounts for this difference? One explanation is the **selection** thesis. According to this theory, sick or vulnerable persons are unable to compete economically because of their ill-health and therefore wind up being poor, uneducated and unemployed. Most researchers believe that this mechanism may account for some, but cannot account for all or even most of the excess ill-health of the poor.

The **materialist** thesis, that low SES leads to poor health, is more consistent with research findings, especially findings from longitudinal studies. These studies follow a group of people over a long time period, observing health changes. They are able to note whether life-events or changes in social circumstances precede the health changes or follow them.

An important Canadian longitudinal study found that a drop in income leads to poorer health even after taking into account such health-related behaviours as smoking or exercise (Hirdes et al., 1986). Other longitudinal studies provide similar findings (Wilkinson, 1986). Moreover, there is a well-documented life-cycle of poverty and poor health, beginning with inequities in access to healthful nutrition in pregnancy, and continuing through infancy, childhood and adulthood (Labonte 1990a).

To quote from a summary of research in the United Kingdom: "...economic inequalities leading to deprived living conditions are paramount in determining the much poorer health status of lower class infants and children; (only) at the later stages of life (do) individual attitudes and behaviour, voluntary lifestyles and life events enter more clearly as important possible determinants of health" (Blaxter in Wilkinson, 1986).

Unequal social circumstances appear to create disease to a far greater extent than disease creates unequal social circumstances.

1.2.2 Poverty and Health Status

Researchers use SES categories to study the disease effects of social inequalities. But people do not experience their SES category, they experience poverty. To understand the policy implications of poverty and health status, we must look closely

at the difference between two kinds of poverty: basic poverty and relative poverty (Townsend, 1986).

Basic poverty exists when a person lacks access to public goods and services (health care, education, housing, employment, welfare) that, to varying degrees, improve their odds in coping with disease. Basic poverty exists in sizeable pockets of Canadian society, such as native reserves and, to a lesser extent, low-income neighbourhoods.

Basic poverty can be remedied by larger or more equitably distributed investments in public services, but only to a degree. It has been suggested by many that investments in health care spending have passed their margin of utility, meaning that spending in other policy areas such as housing, job creation, welfare reform or environmental protection would yield far greater returns in health than similar spending on health care (Evans and Stoddart, 1990; Labonte, 1990b).

The importance of welfare policies to health cannot be understated. Infant mortality increased in 11 American states and many inner city low-income neighbourhoods during the 1982 recession. While the recession was the economic background, the rise in infant mortality directly paralleled reductions in nutrition programs and welfare benefits for poor mothers (Brown, 1987; Miller, 1985).

Relative poverty, or relative deprivation, exists when there are large gaps between affluent and poor members of society. Relative poverty seems to influence health independently of the effects of basic poverty. The Whitehall study of British civil servants, as one compelling example, found more than threefold differences in mortality between the lowest and highest grades in the male civil service (Wilkinson, 1986).

In this study, none of the civil servants was living in basic poverty, and all had good job security. They all worked in the same location, London, and were not exposed to industrial hazards. Yet for nearly every cause of death, there was a clear relationship between civil service grade and mortality. There was something about the socioeconomic hierarchy itself (the relative poverty experienced by lower grade male civil servants) that, independent of income or environment, appeared to create a health risk.

Another British study (Marmot and Theorell, 1988) concluded that work conditions, and in particular the freedom to make decisions, are the basis for the strong association between socioeconomic status and heart disease; and that "above a threshold of poverty, position on the social hierarchy may be a more important determinant of health and disease than material conditions."

The issue of national health and wealth is obviously more complex than a simple calculation of gross national product (GNP).

The Organization for Economic Cooperation and Development (OECD) comprises the world's most economically powerful countries. Among OECD countries, those with the greatest after-tax income equality have the lowest infant mortality rates and longest life expectancies. This effect is independent of the absolute level of income or wealth within a country (Wilkinson, 1986). Similarly, while socioeconomic differences in disease and death rates exist in all European countries, they are greatest in countries where income inequalities are greatest (Smith et al., 1990).

Inequalities in income distribution, and what they may represent in terms of the experience of power, may be more important to health than income itself, at least in wealthy countries.

Data from other countries support the general conclusion that wealth-sharing is more important to health than mere wealth-creation. The United States ranks high on per capita GNP and health care spending but low on income equality. It also ranks low on its health indicators.

Japan, as another example, has made substantial health gains over the past two decades and is now the world leader in life expectancy and infant survival. These gains are as great as Britain might achieve if it "abolished heart disease and most cancers" (Marmot and Smith, 1989). They are attributed partly to Japan's economic growth, and partly to its relatively equitable income distribution, for Japan also ranks fairest in income distribution amongst OECD nations.

1.2.3 Public Policy Implications

The implications of this evidence for public policy are therefore only partly a matter of how much wealth a nation creates. A nation needs sufficient national income to prevent basic poverty, that is, wealth creation is basic to health (Smith, 1990). But, once that is achieved, as it has been in wealthy countries such as Canada, the research appears to show that what affects health is how equitably that wealth and the decision-making power it provides is shared within the nation.
This phenomenon has been called health without wealth. It is particularly striking in low per capita GNP countries, and challenges the theory that continued economic growth (as measured by continued GNP expansion) is a prerequisite to both economic and human health. Many third world countries with low GNPs and high income equality have much better health indicators than

countries with high GNPs and low income equality. These countries have also sustained these benefits as their enlarged cohort of surviving babies grew to be adults (UNICEF 1984, 1989). If nothing else, the health improvements of economic growth and wealth creation may have a ceiling effect: gains in female life expectancy appear to flatten out when per capita GNP reaches a certain level ($3000 in 1985, a mere one-fifth of the U.S. per capita GNP at that time) (Shirlow, 1990).

These findings have profound economic and environmental implications. There is growing evidence that our planet cannot support continued resource use and waste production (WCED, 1987). There are real limits to economic growth and wealth creation (Daly and Cobb, 1990). Economic development, however, is limitless. Economic development refers to a value shift from quantity of production to quality of production, what the Ontario Round Table on Environment and Economy calls "doing better with less" (ORTEE, 1990). This shift would benefit, rather than compromise, human health.

Health requires a basic level of material production and consumption. Beyond a certain point, however, research on population health and economic development suggests that greater improvements in population health can be achieved by wealth distribution policies than by creating more wealth or by increased spending on health care.

1.3 The Socioenvironmental Approach to Health

To make the link between health equity and public policy in public health theory and practice, a new way of thinking about health has been required. This new approach has been evolving over the past decade (Labonte, 1990a).

The evolution began with a critique of the so-called **medical** model. This approach, also called the high-risk approach, focuses on problems that can be characterized in terms of disease categories such as cancer and heart disease. It is primarily concerned with physiological risk factors and is illness-care oriented. Medical services tend to be targeted to high risk individuals.

The limitations of the medical model of health are now so well known that its role in the field of public health is limited. In its place is an approach that incorporates the medical model when appropriate, and goes beyond it to a **behavioural** approach. This approach usually targets the entire population and uses multiple risk factor reduction strategies, so that it is sometimes called the population or multiple risk factor reduction approach. It is

also called a lifestyle approach because it is primarily concerned with behaviours such as smoking, poor nutrition and lack of exercise. These behavioural risk factors are the focus of social marketing, health education and advocacy for legislation that support lifestyle changes. This approach may also address some psychosocial risk factors.

It is probably fair to say that the behavioural approach is the predominant way of thinking about health in the field of public health at present. However, this approach has also been criticized, and in the same way as the behavioural approach incorporated the medical model, the new socioenvironmental approach incorporates both of them.

The **socioenvironmental** approach seeks to address physiological risk factors, behavioural risk factors, psychosocial risk factors and socioenvironmental risk conditions. The relationships among these risk factors and conditions and the way they influence health status is shown in **Figure 1-1.**

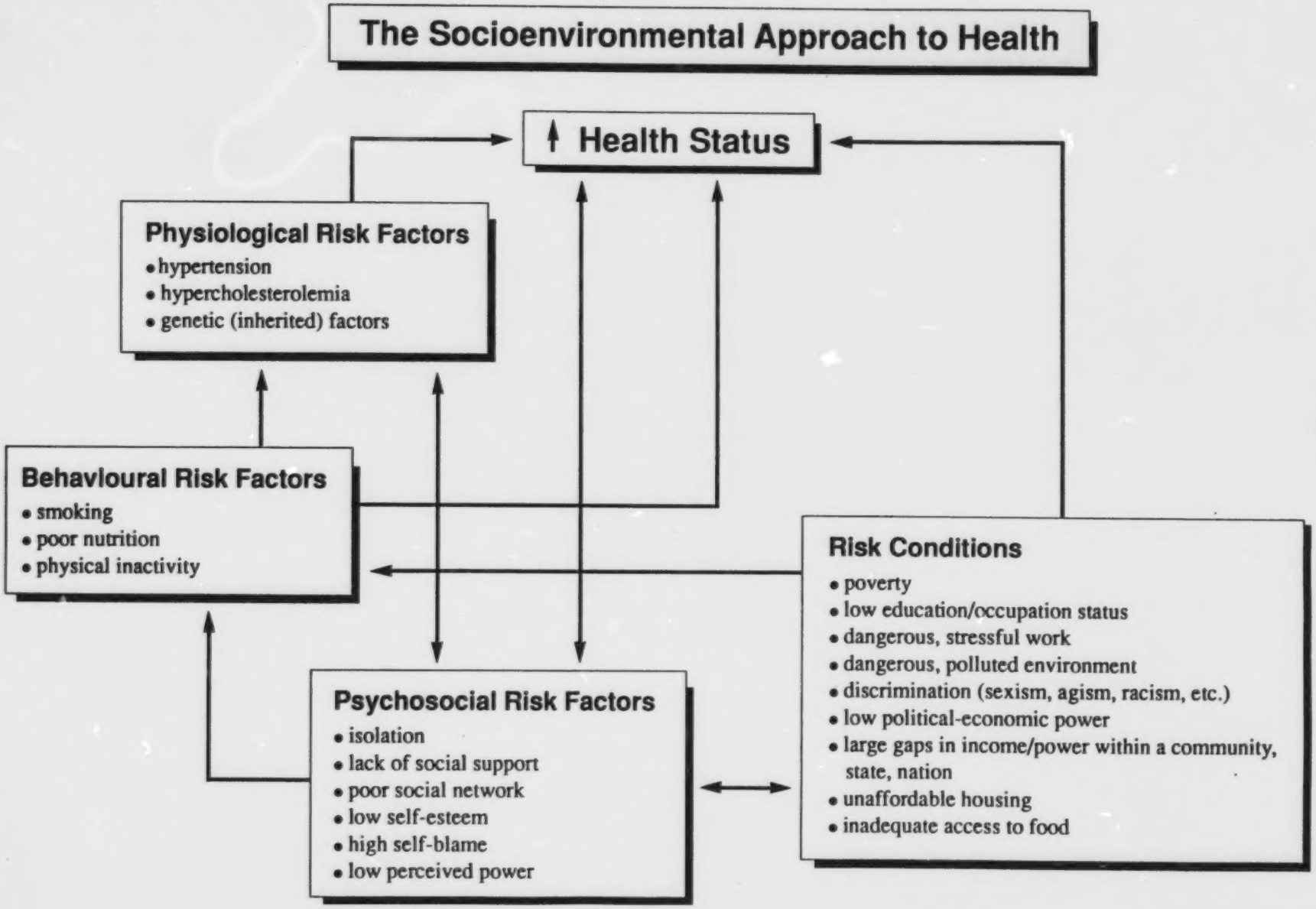
The significance of this new approach lies in the way it conceptualizes the relationships among these risk factors and conditions and in the central role it gives psychosocial risk factors, and most importantly, in its focus on risk conditions.

The term **risk conditions** is highly significant. It is meant to convey the notion that there are conditions that are beyond the capacity of any individual to control or change. Physiological, psychosocial and behavioural risk **factors** are characteristics that pertain to individual persons and are therefore theoretically, at least, amenable to change in individuals.

An individual may be poor, but poverty, as we saw in Section 1.2 above, is a condition that can only be changed at the societal level. Individuals, including children, are poor largely because society condones poverty. If we want to eliminate poverty or inadequate education or discrimination we can, but it requires changes in public policy and in societal structures and institutions, not just changes in individual behaviour.

There is an implicit critique of the behavioural risk factor approach here, with its inherent tendency to blame the victim. If a person's health can be improved significantly by lifestyle changes, then surely it is up to that person to make the necessary changes. However, research on behavioural risk factors has revealed that there are significant socioeconomic differences in risk behaviours (Wilkins, 1988; Millar and Wigle, 1986).

Figure 1-1


The Socioenvironmental Approach to Health
Health Status
Physiological Risk Factors
• hypertension
• hypercholesterolemia
• genetic (inherited) factors
Behavioural Risk Factors
• smoking
• poor nutrition
• physical inactivity
Psychosocial Risk Factors
• isolation
• lack of social support
• poor social network
• low self-esteem
• high self-blame
• low perceived power
Risk Conditions
• poverty
• low education/occupation status
• dangerous, stressful work
• dangerous, polluted environment
• discrimination (sexism, agism, racism, etc.)
• low political-economic power
• large gaps in income/power within a community, state, nation
• unaffordable housing
• inadequate access to food

The initial response to these research findings was to target risk reduction programs to high risk groups. Sober second thought led to a concern with psychosocial risk factors that may make it difficult for a person to change their behaviour. Psychosocial risk factors include isolation, lack of social support, poor social networks, self-blame, and low perceived power. Conversely, good social support, self-esteem and a sense of empowerment can enable a person to make changes in their life. To some extent these psychosocial risk factors are amenable to direct intervention by health practitioners.

Gradually an appreciation has grown of the role of risk conditions and the way they underlie many of the above factors. Socioenvironmental risk conditions are living situations that may support unhealthy lifestyles that increase susceptibility to ill health. These conditions include basic poverty, lack of affordable housing or access to adequate food, low educational level or occupational status, dangerous or stressful work or physical environments, discrimination, war and other forms of violence, relative political and economic powerlessness, and large gaps in the distribution of income in the nation or community where a person lives.

The socioenvironmental approach to health is based upon a growing body of research. People who experience relative powerlessness as measured by lower socioeconomic status indicators are more likely to experience morbidity and premature mortality (Wilkinson, 1986; Wilkins and Adams, 1983; D'Arcy, 1989; Wilkins 1988; WHO Europe, 1984). They are more likely to work in dangerous stressful jobs and to live in polluted neighbourhoods (Harding, 1987; Gustavesen, 1988).

They are also more likely to experience less social support and report fewer social networks (Auslander, 1988; Berkman, 1986), and to have low self-esteem, be unhappy and experience self-blame and a sense of powerlessness (Lerner, 1986; Harding, 1987). Lack of social support poses a significant independent health risk; that is, people lacking social support have twice the risk of dying and an increased risk of disease, independent of any other known risk factor (Rogers, 1987).

People experiencing these psychosocial risk factors and socioenvironmental risk conditions are more likely to engage in health-damaging behaviours which reflects, in part, a "stress-buffering, stress-coping" strategy, in the relative absence of social support or social networks (Gottlieb et.al., 1984; Hibbard, 1988).

Because they experience less social support and greater isolation, these people are also less likely to be active in community groups or processes concerned with improving living,

working, economic, political or environmental conditions (Auslander, 1988; Minkler, 1985). This reinforces isolation and self-blame.

This constellation of risk factors and risk conditions is illustrated in Figure 1-1. Collectively, the presence of psychosocial risk factors and socioenvironmental risk conditions represent an absence of the basic prerequisites for health.

It has become clear that social and environmental change is required as well as change in individual behaviour and that risk conditions fall as much within the scope of public health as risk factors. The behavioural approach was a logical stage in the evolution of current thinking about health and it was probably inevitable that the socioenvironmental approach would evolve from it.

As ways of thinking about health evolve, so must the research agenda. In the next section, we introduce three studies that were designed to explore the relationships among risk factors, risk conditions and the health status of City of Toronto residents.

1.4 Three Studies: The Scope of This Report

Data-based planning has been a priority in the Department of Public Health since the era of Public Health in the 1980s (City of Toronto, 1978). For more than a decade, two major data bases of vital statistics have been developed and maintained by the Department's Community Health Information Section. The first, a record of births to all women who reside in the City of Toronto, has been used extensively to document differences in the reproductive experience of these women (City of Toronto, 1989; CHIS, 1988). The second, a record of all deaths that occur to City of Toronto residents, has been used primarily to monitor trends in the mortality experience of the City as a whole.

Thus, we have been able to document the decline in mortality from circulatory diseases, to chart significant changes in the pattern of cancer mortality, and to identify the causes of death that contribute the most to premature mortality (City of Toronto, 1989b). We have analyzed differences in the mortality experience of the four Health Areas, but until now have made only preliminary attempts to investigate the basis for these differences (City of Toronto, 1983; 1988).

These mortality data were used for two of the studies on health inequalities that form the basis of this report. The database contains just two variables that relate to the theoretical framework set out in Figure 1-1. The first, country of birth, can be used as an indicator of ethnocultural differences which in

turn may indicate risk conditions such as discrimination or linguistic and cultural barriers. The second variable, the census tract in which the decedent resided at time of death, can be used to investigate risk conditions such as poverty.

We have designed two studies around these two pieces of information. One study, because we have good data on country of birth for each decedent, is an individual-level study of the relationship between country of birth and mortality. We construct age-standardized mortality rates, for men and women, for Canadian-born and foreign-born Torontonians, and compare them. The second study is an ecological analysis of the relationship at the census tract level between mortality and income, education, occupation and first language.

For both studies we look at deaths that occurred during the period 1984-88; the large number of deaths that occurred during this five-year period permits more detailed analysis than would be possible for a shorter time period. The necessity of using 1986 census data to calculate mortality rates limited us to the period immediately before and after the census.

The third study makes use of data that were collected for the Toronto Community Health Surveys (TCHS) of 1983 and 1988. These were surveys of the general population of the City of Toronto, and in each case, nearly 1000 City residents were interviewed.

Data were collected for respondents' age and sex; their smoking, drinking and exercise habits; marital status, psychological well-being (1983 only) and social support (1988 only); their ethnocultural background and socioeconomic status (income, education, occupation); as well as their own perception of their health status, the presence of certain chronic conditions and any limitation in normal activities they might have experienced because of their health.

These data permit direct investigation of the relationships among some of the risk factors and risk conditions shown in Figure 1-1. The third study was designed to test the specific hypothesis that health status is associated with both risk factors and risk conditions.

The collection and analysis of vital statistics and general population survey data has been a primary focus of the Department of Public Health's research and information effort in recent years. One of the objectives of these studies has been to ascertain whether, and to what extent, these data can be used to address the research questions of the future. We return to this issue in the concluding chapter.

The results of the three studies are reported in detail in chapters two through four. These chapters are quite technical and many readers will prefer to go directly to chapter five, which summarizes the studies and pulls out their common threads.

In the three data chapters we adopt conventional research terminology and refer to socioeconomic status and ethnocultural variables instead of risk conditions. In chapter five, socioeconomic and ethnocultural differences in health status are then interpreted in terms of the socioenvironmental approach.

In chapter five, we also discuss in general terms some of the implications of our findings for public policy, and for the Department of Public Health in the areas of research and advocacy for the basic prerequisites for health.

CHAPTER TWO

COUNTRY OF BIRTH AND MORTALITY

2.0 COUNTRY OF BIRTH AND MORTALITY

2.1 Background

This chapter presents the results of our investigation of the relationship between country of birth and mortality.

Because of the multicultural nature of the City of Toronto's population, the collection and analysis of cultural data has become a priority for the Department of Public Health. Special studies of specific ethnocultural groups (City of Toronto 1984b, 1989a, 1990b; Access Alliance, 1989) as well as the daily experience of DPH staff suggest that there may be important ethnocultural differences in the health status of the City's population. Linguistic and cultural barriers to access to health care, racial discrimination, the traumatic experience of refugees and differences in cultural values and practices are all potential risk conditions.

The literature on ethnocultural differences in health status tends to confirm this view. The Office of Minority Health (OMH) in the United States, for example, has identified a wide gap between Minorities (which include Blacks, Hispanics, Native Americans and Pacific Islanders) and Whites in death rates for heart disease and stroke. OMH data also show that Minorities are more often the victims of homicide, suicide, and unintentional injuries when compared with Whites. For example, older Chinese and Japanese women demonstrate a higher risk of suicide than their White counterparts; for men aged 25 to 34, the Black homicide rate is seven times the rate for Whites (U.S. DHHS, 1985).

In Britain, there is little systematic evidence of ethnocultural differences in health status because ethnocultural data are not recorded in census, health service or other routinely collected statistics. National studies therefore have to rely on data about place of birth which is recorded on death certificates and in the 1971 Census, and refers essentially to immigration rather than ethnocultural affiliation per se.

According to an important British study by Marmot, Adelstein and Bulusu (1984), men in most immigrant groups had age-standardized mortality rates that were lower than the rates for all men in England and Wales and lower as well than rates for men in their respective countries of birth. With the exception of immigrants from Europe, immigrant women were found to have higher standardized mortality rates than those prevailing in England and Wales, but lower rates than those in their respective countries of birth.

In Canada, there is a growing body of literature on native health but little other published data concerning ethnocultural differences in health status. At the national survey level, the paucity of data reflects an apparent lack of consensus or consistency in the measurement of ethnicity in Canada. Of the health surveys sponsored by the federal government, birthplace, ethnic affiliation in relation to parental heritage, and language spoken at home have been variously used.

In some of these surveys, respondents were restricted in the categories they could use to identify their ethnocultural background and identity, thereby limiting analysis to broad and non-specific groupings. In the other surveys, published reports have not included an assessment of ethnocultural data that were collected. These data are available for special tabulations upon request in some cases, but because of the cost involved are not readily accessible.

The 1985 Health Promotion Survey conducted by Statistics Canada included some analysis of ethnocultural differences in health status. The results showed that Canadians whose home language was neither English nor French had the most activity restriction and the poorest self-rated health status. The measurement of ethnocultural affiliation was limited to a three-category scale, however (Wilkins, 1988).

2.1.1 Measurement of Ethnocultural Differences

In an attempt to force clarity of concepts and consistency in the use of indicators, Statistics Canada recently decided to eliminate the word "ethnicity" from its census glossary. Henceforth, Canadians will be asked in more specific terms about their ethnic origin or ethnic identity in surveys and censuses undertaken by this agency.

We have adopted the convention of referring to "ethnocultural" differences to emphasize that the cultural aspect of ethnic origin or identity is relevant to health.

As seen in the studies reviewed above, a variety of indicators has been used to study ethnocultural differences in health status. Racial background is most commonly used in the United States. Immigrant status or country of birth has been the most widely-used indicator in Britain. Other commonly-used indicators include first language, language spoken at home, and self-reported ethnic affiliation or ethnic origin. Using the ethnic origin of one's ancestors as an indicator, for instance, British and French were the numerically dominant ethnocultural groups in Canada in 1986, the British comprising 34 percent and the French 24 percent of Canada's population respectively (White, 1990).

Country of birth is perhaps the weakest ethnocultural indicator. A Toronto resident whose parents were born in Italy, for example, could report Canada as her country of birth while maintaining a strong sense of herself as Italian-Canadian. In this case, first language or language spoken at home might be more informative ethnocultural indicators than country of birth.

Ideally, an explicit theory of ethnocultural differences in health status should guide the construction of indicators and appropriate measurement approaches. However, practical considerations usually guide the choice of indicator. In this study, country of birth is used as the indicator of ethnocultural differences because it is the only one available in the data set that was analyzed.

2.2 Data and Methods

2.2.1 Mortality Data

Mortality is one of the most common indicators used to reflect the health status of a population, in large part because of the ready availability of vital statistics data that must be collected by law. While their sensitivity to the health experience of a population is limited, mortality data do provide information on the summary impacts of disease on a population, and they can be comparatively reliably measured.

The Department of Public Health of the City of Toronto has maintained a comprehensive and detailed mortality data base since 1979. The Department receives a copy of the death certificate of each Toronto resident who dies within or outside the City. These certificates provide information on date of birth, country of birth, sex, date of death, place of residence at the time of death, and underlying cause of death, coded according to the categories in the International Classification of Disease, 9th Revision (ICD-9).

The Department makes considerable effort to ensure that this database is sound. Liaison is maintained with the Registrar General's Office and the Metropolitan Toronto Coroner's Officeto facilitate validation of the country of birth and cause of death coding.

This study is based on deaths that occurred in the City over a five-year period from 1984 through 1988, the mid-point ofwhich was the census year of 1986. A total of 25,485 deaths among City of Toronto residents was recorded for this period. Country of birth could not be identified for just two percent of them.

FIGURE 2-1

MORTALITY BY COUNTRY OF BIRTH

City of Toronto, 1984-1988

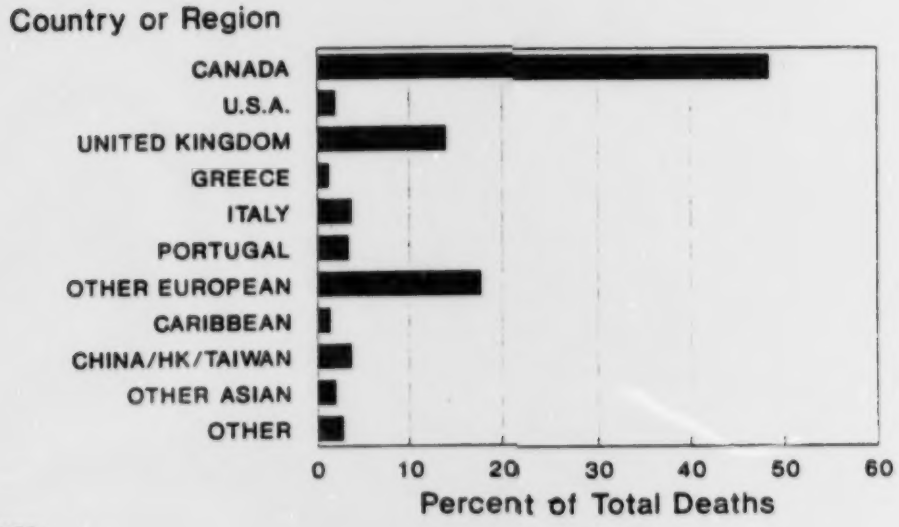


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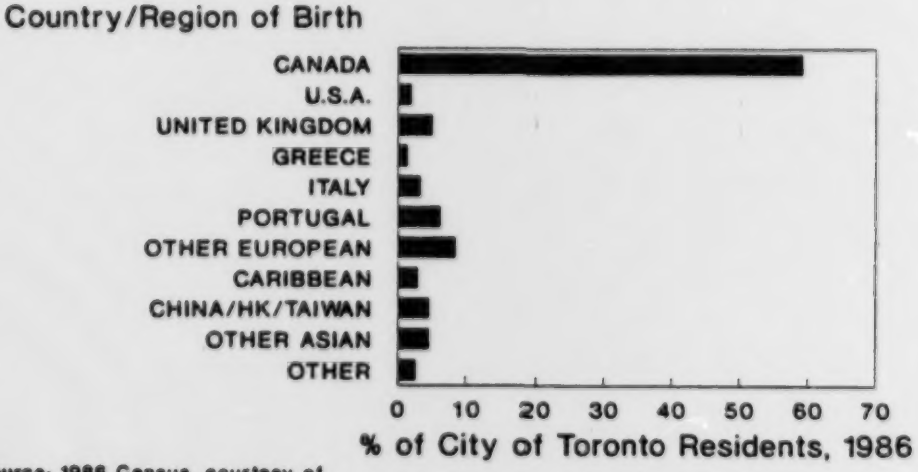
FIGURE 2-2

COUNTRY OF BIRTH

City of Toronto Residents, 1986



Source: 1986 Census, courtesy of
Ethnocultural Data Base Office
Ontario Ministry of Culture

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Each record of a death was originally coded for the deceased person's specific country of birth. The number of deaths for some countries of birth was too small to permit statistical analysis, however. In these cases, we aggregated countries of birth into regions, on the assumption that people born in these areas would share some ethnic or cultural similarities.

The general principle was to use specific countries of birth whenever the number of cases permitted and to aggregate countries into regions that were as small and homogeneous as possible. Hence the categories: Canada, United States, United Kingdom, Greece, Italy, Portugal, other European countries, Caribbean countries, China, Hong Kong and Taiwan and other Asian countries. For convenience we will refer to country of birth, even though we are referring to regions in some cases. Although this aggregation into regions was necessary for statistical purposes, it makes the validity of country of birth as an ethnocultural indicator even more problemmatic.

Distribution of the 25,485 deaths by country of birth is shown in **Figure 2-1**. Fewer than half of Toronto residents who died during the study period, 48.4 percent, were born in Canada. More than half, 51.6 percent, were born outside Canada, in the following countries or regions:

17.7 per cent in European countries other than Greece, Italy and Portugal);
14.0 percent in the United Kingdom;
3.7 percent in Italy;
3.7 percent in China, Hong Kong and Taiwan;
3.3 percent in Portugal;
2.0 percent in Asian countries other than China, Hong Kong and Taiwan;
2.0 percent in the United States;
1.3 percent in Carribean countries;
1.2 percent in Greece; and
2.7 percent in all other countries of the world.

A breakdown of the City's 1986 population by country of birth was obtained from the Ethnocultural Database Office of the Ontario Ministry of Citizenship. These data are shown in **Figure 2-2**. Considerably more than half of the people who lived in Toronto during the study period, 59 percent, were born in Canada; 41 percent of City of Toronto residents were born outside Canada.

In other words, there were proportionately more deaths among foreign-born Toronto residents than one would expect given their numbers in the population. As the results of our analysis will

make clear, however, this is due to differences in the age structure of Canadian-born and foreign-born City residents.

The breakdown of country of birth for foreign-born City residents in 1986 was as follows:

8.5 percent in European countries other than Greece, Italy and Portugal);
5.0 percent in the United Kingdom;
3.3 percent in Italy;
4.5 percent in China, Hong Kong, and Taiwan;
6.2 percent in Portugal;
4.6 percent in other Asian countries;
2.0 percent in the United States;
2.9 percent in Caribbean countries;
1.4 percent in Greece;
2.6 percent in all other countries of the world.

Although the above data on the 1986 population of the City of Toronto exclude residents of certain health care institutions, we did not exclude deaths that occurred in these institutions from our analysis. This may compensate to some extent for the tendency for terminally-ill immigrants to "go home to die" (Muir and Staszewsi, 1986).

2.2.2 Measures

Mortality is measured in a variety of ways of varying utility, depending upon the purpose at hand. In this study we used the directly-standardized mortality rate (DSR) as the measure of mortality because it enables us to compare in a meaningful way the mortality rates among groups with different age and sex distributions.

Crude death rates among different groups may result from differences in their age and sex structure: Group A may have a high death rate because it has a high proportion of older men, for instance, while Group B may have a low death rate because it has a high proportion of young women. Comparing the death rates of these two groups would be misleading because they have a different age and sex structure.

By using directly-standardized rates (DSRs), we are able to take account of the influences of age and sex on death rates by adjusting, or standardizing, the age and sex structure of all groups to a standard population. In our case, the population of the City of Toronto as a whole was chosen as the standard. We can then compare the various groups as though they had the same age and sex structure. Any differences in the DSRs of two

countries, therefore, will occur because of differences in their mortality experience that have nothing to do with age and sex.

We investigated mortality on the basis of disease categories that have been identified as major causes of death in the City. We have taken our categories from the ICD-9. In addition to calculating DSRs for death from all causes combined (ICD 001-999), we have calculated DSRs for the following major ICD-9 chapters:

* diseases of the circulatory system (ICD 390-459)
* neoplasms (ICD 140-239)
* diseases of the respiratory system (ICD 460-519)
* diseases of the digestive system (ICD 520-579)
* accidents and injuries (ICD 800-999)
* symptoms, signs and ill-defined conditions (ICD 780-799);

In addition, we have calculated rates for specific diseases. For the circulatory system we have calculated DSRs for the following:

* myocardial infarction, or heart attack (ICD 410);
* other ischaemic heart diseases (ICD 411-414, excluding 410);
* acute cerebrovascular disease, or stroke (ICD 436);

for specific neoplasms:

* cancer of the lung and trachea (ICD 162)
* female breast cancer (ICD 174);

and from the respiratory system category, specifically:

* pneumonia and influenza (ICD 480-487).

DSRs for males and females (referred to henceforth as DSRMs and DSRFs) were calculated for the above-listed disease categories, for each of the ten countries or regions of birth.

2.2.3 Methods

Our basic method was to compare the DSRs for particular disease categories for Canadian-born Toronto residents with DSRs for each of the other nine groups and to look for overall patterns in the results. Because of the exploratory nature of this work, the emphasis is on consistency of results across different causes of death. In making comparisons between Canadian-born and foreign-born DSRs we used, as a rule of thumb, the overlap of 95 percent confidence intervals to determine whether the observed differences between rates were statistically significant.

Our method therefore required comparison of the DSRs and the confidence intervals for each disease category, for each country or region of birth, for both males and females. The difference between any two DSRs was only considered to be statistically significant if there was no overlap in their confidence intervals. In many cases there was a small amount of overlap; in these cases the answer to the question of whether differences are statistically significant is equivocal.

We also considered whether there were substantive differences between Canadian-born and foreign-born DSRs. In analyzing the overall pattern of results, we looked to see whether there was a consistent pattern of differences in the DSRs regardless of whether they were statistically significant.

Three steps were taken to investigate the patterning of the results. First, for each country of birth for each disease category, we determined whether its DSR was higher or lower than the DSR for Canadian-born residents for that disease category.

To further distinguish the DSRs for each country of birth from DSRs for Canadian-born residents, a second step was taken: for each disease category, we identified the two countries with DSRs closest to the DSR of the Canadian-born group and the two countries with DSRs farthest from the Canadian-born group. In some cases, identical DSRs were calculated for two or more foreign countries within a given disease category, so that more than two countries may be identified as 'closest to' or 'farthest from' Canadian-born DSRs.

As a third step, the DSRs for males and females of the 'closest to' and 'farthest from' countries were compared for each disease category. If male and female DSRs within a country of birth held the same position relative to Canadian-born DSRs values, one might infer that country of birth was indeed associated with mortality.

2.3 Results

2.3.1 Mortality From All Causes

Figures 2-3 and 2-4 compare the DSRs for males (DSRMs) and females (DSRFs), respectively, for all causes of death combined and provide an overview of the patterns observed.

By examining the confidence intervals shown in Figure 2-3, we see that the difference in DSRMs for Greek-born Toronto men and Canadian-born Toronto men were statistically significant. The DSRM for Toronto residents born in Greece was lower than the rate

FIGURE 2-3

MORTALITY RATES BY COUNTRY OF BIRTH
Males, City of Toronto, 1984-1988

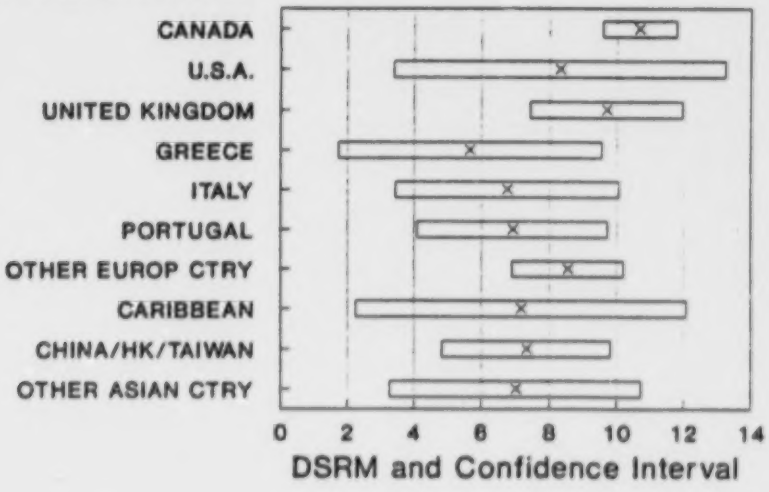

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FIGURE 2-4

MORTALITY RATES BY COUNTRY OF BIRTH
Females, City of Toronto, 1984-1988

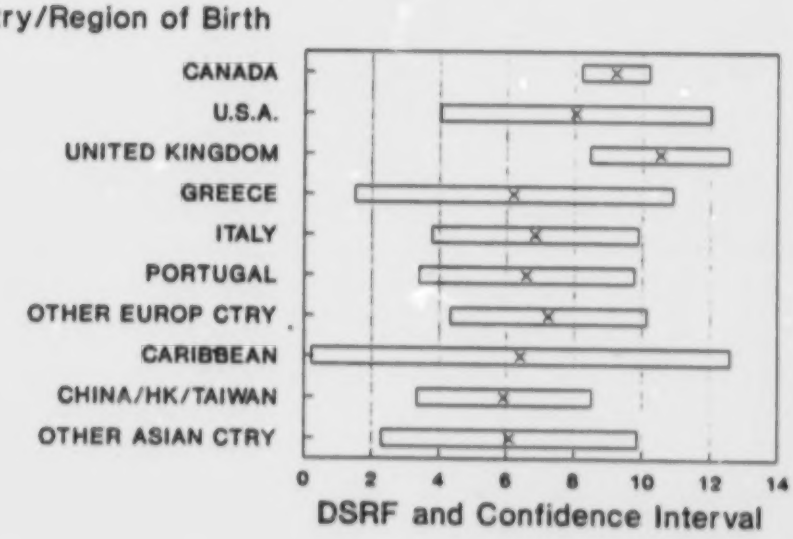

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TABLE 2-1

A COMPARISON OF MORTALITY RATES* FOR MAJOR ICD-9 CHAPTERS BY COUNTRY OR REGION OF BIRTH MALES, CITY OF TORONTO, 1984-88

COUNTRY/REGION OF BIRTH	CIRC. SYSTEM	CANCER	RESP. SYSTEM	DIGEST. SYSTEM	ACCIDENT INJURY	ILL-DEFINED
United States	—	—	—c	—	—	—
United Kingdom	—c	—c	—c	—c	—	—
Greece	—f	—f	—	—	—	—
Italy	—	—	—f	—	—f	—f
Portugal	—	—	—	—c	—	—
Other Europe	—c	—	—	—	+c	—
Caribbean	—	—	—f	—f	—	—f
China/HK/Taiwan	—f	—c	—	—f	—f	+c
Other Asian	—	—f	—	—	—c	—c

*** Compared with mortality rates for males born in Canada**

Legend:

+	DSR is higher, but difference is not statistically significant
—	DSR is lower, but difference is not statistically significant
c	DSR is relatively closest to Canadian-born DSR
f	DSR is relatively farthest from Canadian-born DSR

for Canadian-born men and there is no overlap in the confidence interval for the two DSRs.

Men born in Italy, Portugual, other European countries, and in China, Hong Kong and Taiwan also exhibited lower DSRMs than Canadian-born Toronto males. These differences are not statistically significant, but there is so little overlap in the confidence intervals that they have considerable substantive interest.

The results for men born in other Asian countries, the Caribbean, and the United States overlap the results for Canadian-born males and have such wide confidence intervals that no confident inferences can be drawn from these comparisons.

Men born in the United Kingdom, on the other hand, exhibited considerable overlap with males born in Canada but within a comparatively narrower range, suggesting that the mortality experience of Toronto males born in Canada and the United Kingdom may be similar.

A comparison of the DSRs among women (DSRF) is presented in Figure 2-4. Women born in Italy, Portugal, other European countries, China and Hong Kong, and in other Asian countries had lower DSRFs than those born in Canada. These differences are not statistically significant, but again, there is so little overlap in the confidence intervals, especially for the China, Hong Kong and Taiwan group, that they may be important.

No inferences can be drawn from Figure 2-4 about women born in other countries because the confidence intervals are so wide. The pattern for females born in the United Kingdom, however, appears to be the reverse of the results we noted for men born in the U.K., that is, there is overlap with the Canadian-born group but with values extending to the higher ranges.

2.3.2 Mortality From Major Types of Disease

In the following tables we compare the DSRs for Canadian-born Toronto residents with the DSRs for Toronto residents who were born in the other countries or regions for each of the following ICD-9 chapters: diseases of the circulatory system, cancers of all types combined, diseases of the respiratory and digestive systems, accidents and injuries and ill-defined signs and symptoms.

Table 2-1 presents the comparisons for men. The results for Canadian-born men are not included in the table because they are the basis for comparison. Pluses and minuses indicate whether the estimated DSR for a given country or region was higher or lower

than the estimated DSR for Canadian-born men. The subscripts c and f indicate whether a given DSR was closest to or farthest from the Canadian-born DSR for that disease category.

No statistically significant differences in DSRMs between Toronto men born in Canada and those born in other countries were detected in any of the ICD-9 chapters. Looking more closely at the results presented in Table 2-1, however, it is apparent that virtually all the DSRMs of men born outside Canada were lower than the DSRMs for those born in Canada for all the major ICD-9 chapters. There are just two exceptions to this pattern.

A second kind of patterning emerges when we identify the respective countries for which the DSRMs are relatively close to or relatively far from the DSRMs for the Canadian-born group. The two closest and the two farthest values relative to the DSRMs of the Canadian-born group have been identified for each disease category. Reading across the rows of Table 2-1, by country of birth, the following patterns of interest emerge:

- men born in the United Kingdom had DSRMs virtually identical to Canadian-born DSRMs for four of six ICD-9 chapters;

- men born in Italy, the Caribbean and in China, Hong Kong or Taiwan had DSRMs relatively farthest from (and lower than) Canadian-born DSRMs for three of six ICD-9 chapters;

Table 2-2 presents a comparison of DSRFs for major ICD-9 chapters for women born in Canada and those born in other countries. No statistically significant differences in DSRFs occurred for any of the ICD-9 chapters but, as with men, there is a definite pattern in the results. Virtually all the DSRFs for women born outside of Canada were lower than those for Canadian-born women. There were just six exceptions to this pattern.

The second order patterning for females born outside of Canada is also striking. Reading across the rows of Table 2-1 the following patterns appear:

- females born in the United Kingdom and the United States had DSRFs virtually identical to Canadian-born women for three of the six ICD-9 chapters;

- females born in China, Hong Kong, and Taiwan had DSRFs farthest from (and lower than) Canadian-born DSRFs for three of six ICD-9 chapters.

TABLE 2-2

A COMPARISON OF MORTALITY RATES* FOR MAJOR ICD-9 CHAPTERS BY COUNTRY OR REGION OF BIRTH FEMALES, CITY OF TORONTO, 1984-88

COUNTRY/REGION OF BIRTH	CIRC. SYSTEM	CANCER	RESP. SYSTEM	DIGEST. SYSTEM	ACCIDENT INJURY	ILL-DEFINED
United States	—c	—c	+c	—	+	—
United Kingdom	+c	+	+	—	—c	—c
Greece	—	—	—	+c	—f	—
Italy	—	—	—	—f	—	—f
Portugal	—	—f	—c	—c	—f	—
Other Europe	—	—c	—	—f	—	—
Caribbean	—	—	—f	—	—	—f
China/HK/Taiwan	—f	—	—f	—f	—	—
Other Asian	—f	—f	—	—	—c	—c

* **Compared with mortality rates for females born in Canada**

Legend:

+	DSR is higher, but difference is not statistically significant
—	DSR is lower, but difference is not statistically significant
c	DSR is relatively closest to Canadian-born DSR
f	DSR is relatively farthest from Canadian-born DSR

TABLE 2-3

A COMPARISON OF MORTALITY RATES* FOR SPECIFIC CAUSES OF DEATH BY COUNTRY OR REGION OF BIRTH MALES, CITY OF TORONTO, 1984-88

COUNTRY/REGION OF BIRTH	HEART ATTACK	OTHER IHD	STROKE	LUNG CANCER	PNEUMONIA
United States	—	—	—	—f	+c
United Kingdom	—	—c	+c	S	+c
Greece	—	—f	—	—	—
Italy	—	—	+c	—	—f
Portugal	—	—	—c	—	—
Other Europe	—c	—c	—	—c	—
Caribbean	—f	—c	+f	—f	—
China/HK/Taiwan	—f	—f	+	—	—c
Other Asian	—c	—	+f	—	—f

* **Compared with mortality rates for males born in Canada**

Legend:

+	DSR is higher, but difference is not statistically significant
—	DSR is lower, but difference is not statistically significant
c	DSR is relatively closest to Canadian-born DSR
f	DSR is relatively farthest from Canadian-born DSR
S	DSR is the same as Canadian-born DSR

2.3.3 Mortality from Specific Diseases

In the following tables we compare the DSRs of Canadian-born Toronto residents with DSRs for residents from other countries of birth for five specific causes of death: Myocardial Infarction (heart attack), other forms of Ischemic Heart Disease, Lung Cancer, Pneumonia and Acute Cerebrovascular Disease (stroke).

Table 2-3 presents the comparisons for males. No statistically significant differences in DSRMs were detected for any of these causes of death. Once again, however, virtually all DSRMs for males born outside of Canada were lower than the DSRMs of the Canadian-born group. There were seven exceptions to this pattern, five of them for stroke.

Reading across the rows of Table 2-3, the following second order patterns emerge:

- males born in the United Kingdom and in Canada exhibited virtually identical DSRMs for four of the five specific causes;

- males born in European countries other than Greece, Italy and Portugal had DSRMs virtually identical to those for Canadian-born males for three of the five specific causes;

- males born in the Caribbean had DSRMs farthest from Canadian-born DSRMs for three of the five specific causes, two were lower and one, stroke, was higher.

Table 2-4 presents a comparison of DSRFs for six specific causes of death for women born in Canada and those born in other countries. Breast cancer is added to the specific causes of death that were investigated for males.

No statistically significant differences in DSRFs were detected for any of these causes of death. Once again, however, most DSRFs are lower for females born outside of Canada than for Canadian-born women. There were 16 exceptions to this pattern, six of them for United Kingdom DSRFs and six of them for stroke.

Reading across the rows of Table 2-4, the following second-order patterns appear:

- females born in the United Kingdom had DSRFs that were virtually identical to Canadian-born DSRFs for three of six disease categories and higher DSRFs for all six (the exceptions noted to the first-order pattern, above);

TABLE 2-4

A COMPARISON OF MORTALITY RATES* FOR SPECIFIC CAUSES OF DEATH BY COUNTRY OR REGION OF BIRTH FEMALES, CITY OF TORONTO, 1984-88

COUNTRY/REGION OF BIRTH	HEART ATTACK	OTHER IHD	STROKE	LUNG CANCER	BREAST CANCER	PNEUMONIA
United States	—	—c	—f	S	—	+
United Kingdom	+c	+	+	+	+c	+c
Greece	—	—	+	—f	—f	—
Italy	—	—	—	—	—c	+
Portugal	—	—	+c	—f	—	—c
Other Europe	+c	—c	—	—	—	—
Caribbean	—f	—f	+	—f	—c	—f
China/HK/Taiwan	—f	—f	S	—c	—	—
Other Asian	—f	—	+f	—	—f	+c

*** Compared with mortality rates for females born in Canada**

Legend:

+	DSR is higher, but difference is not statistically significant
—	DSR is lower, but difference is not statistically significant
c	DSR is relatively closest to Canadian-born DSR
f	DSR is relatively farthest from Canadian-born DSR
S	DSR is the same as Canadian-born DSR

- females born in the Caribbean had DSRFs farthest from (and lower than) those of Canadian-born women for four of six specific causes of death;

- females born in Asian countries other than China, Hong Kong and Taiwan had DSRFs farthest from those of Canadian-born women for three of six specific causes of death; two were lower and one, stroke, was higher.

There is also the suggestion of another pattern in the fact that for stroke, DSRFs for five of nine countries are higher than Canadian-born DSRFs.

2.3.4 Male and Female Comparisons by Country of Birth

We also looked for consistency in the results for males and females for each country or region. The most striking result is for the United Kingdom: both men and women had DSRs closest to and/or higher than Canadian-born DSRs for all types of circulatory disease combined and for ischemic heart disease other than heart attack; for all types of cancers combined; and for all types of respiratory disease combined and for pneumonia in particular.

By reading across the rows in Tables 2-1 through 2-4, several other instances of consistency in the results for males and females can be identified:

- males and females born in the United States exhibited DSRs closest to Canadian-born DSRs for all types of respiratory diseases combined;

- males and females born in Italy exhibited DSRs farthest from Canadian-born DSRs for ill-defined conditions;

- males and females born in Portugal exhibited DSRs closest to Canadian-born DSRs for stroke and for all diseases of the digestive system combined;

- males and females born in other European countries had DSRs closest to Canadian-born DSRs for heart attack and for other types of Ischemic Heart Disease;

- males and females born in Caribbean countries exhibited DSRs farthest from (and lower than) Canadian-born DSRs for respiratory diseases, ill-defined conditions, heart attack, and lung cancer.

- males and females born in China, Hong Kong, and Taiwan had DSRs farthest from Canadian-born DSRs for diseases of the circulatory system in general and for heart attack and other

forms of ischemic heart disease in particular, and for all types of diseases of the digestive system combined.

- males and females born in other Asian countries had DSRs closest to Canadian-born DSRs for injuries and accidents and for ill-defined conditions, farthest from (and lower than) Canadian-born DSRs for all types of cancers combined, and farthest from (and higher than) Canadian-born DSRs for stroke.

It would be easy to place too much emphasis on these patterns. What is striking, in fact, is that these were the only gender pairs observed for each respective country or region of birth. But that is not surprising, given the wide confidence intervals for most of these DSRs. The second and third-order patterns that we have identified in this section are very tenuous and should be used with caution. In the next section, we attempt to draw some very general conclusions from them.

2.4 Discussion and Conclusions

The overall pattern of results in this study suggests that foreign-born Toronto residents, in general, may have lower age-standardized mortality rates than their Canadian-born neighbours.

The striking exception to this overall pattern was for Toronto residents who were born in the United Kingdom: their mortality experience was very similar to the mortality experience of Canadian-born Toronto residents. To a much lesser extent, this was also true for Toronto residents born in the United States and in European countries other than Greece, Italy and Portugal.

On the face of it, these findings would seem to contradict the widespread belief that non-British groups would experience higher standardized mortality rates. However, our results are consistent with substantial literature on immigrant mortality. In a recent review of this literature, Trovato reports that contemporary immigrants tend to have lower mortality rates than their host country (Trovato, 1990).

Trovato identified several potential explanations in the literature on immigrant mortality for observed differences in mortality rates between immigrants and their host country: environment, selection, migration, and genetic predispositions in the etiology of disease. The first three of these explanations are relevant to our concern with risk factors and risk conditions because they relate to the cultural aspects of ethnicity.

Environment in this context refers to cultural values and practices as well as to the physical environment. There are

several ways that cultural values and practices can be health enhancing and protecting. Beneficial dietary practices, a tradition that prohibits women from smoking, stress-buffering religious beliefs, close-knit extended families, and supportive communities: some or all of these characteristics may be found among recent immigrant groups in the City of Toronto (City of Toronto, 1989a).

If Canadian-born Toronto residents are less likely to have close-knit extended families and supportive communities, they may be more likely to die in institutions than their foreign-born neighbours. If this is true, we may have inflated slightly the mortality rates for Canadian-born residents because we did not exclude the deaths of permanent residents of certain health care institutions from the analysis.

Immigrants may also have had less exposure over their lifetime to hazards in the physical environment, in the air, food, water and at work, than Canadian-born residents of the City.

Some inferences about the role of environmental factors vis-a-vis genetic predispositions to disease can be made when immigrants' length of residence in their new country is taken into account. In a recent review of this type of migrant study in the field of cancer epidemiology, the authors conclude that "the differences in the patterns of cancers between regions, countries and ethnic groups, and the changes in risk that occur when parts of a population migrate to another part of the world, constitute the most compelling evidence that the determinants of most human cancers are environmental in nature" (Muir and Staszewski, 1986).

Selection may also be a factor in immigrant mortality. This refers to the possibility that there is some degree of self selection among those who seek to emigrate; perhaps it is the healthiest, most adaptive members of a society who choose to move to a new land.

The third possible explanation is migration. This refers in part to the potential for immigration regulations to favor the fittest, and in this sense it may partially explain our findings. But the actual experience of migration may also be a factor: it can be traumatic in the case of refugees, for example. Being a member of a visible minority in a new, alien culture may also be a risk condition.

The concept of relative poverty that we introduced in section 1.2.2 may also be a part of the migration experience: many immigrants are poor by Canadian standards but better off than their countrymen at home. Their children will probably do even

better, so that migration becomes an experience that adds meaning to their life.

Consequently, the experience of migration may be positive for some ethnocultural groups and negative for others. These differences and their potential health effects, if they exist, would be masked in our data.

It is very difficult with mortality data to tease out the effects of these various aspects of environment, selection and migration. We need to know a great deal more than country of birth. To fully understand the mortality experience of a particular ethnocultural group, we would need to know about early exposure to risk factors and risk conditions in the country of birth, age at immigration, length of residency in the host country, and changing life circumstances after immigration.

Trovato argues that we need to begin to investigate:

> ... immigrant's health status, adaptation, social supports and other attributes important in understanding what happens to the newcomers when they settle in their adoptive land. There is now some convincing evidence, based on controlled follow-up studies of immigrants, that factors such as acculturation to the new society (e.g., diet, lifestyle), degree of traditionalism (maintenance of ethnic traditions), and the extent of social support systems in the immigrant community have a significant bearing on the incidence and prevalence of diseases such as elevated blood pressure and coronary heart disease... (and of) suicide ...

He makes no reference to socioenvironmental risk conditions, presumably because there was no literature in this area to review. Despite this omission, he is clearly right in saying that it is time to move beyond studies based on vital statistics.

The remaining issue, then, is whether it would be useful to expand the database used for this study, either geographically or over a longer time period, in order to obtain statistically significant results. The best way to reduce the confidence interval for a given disease category for a given country of birth is to investigate a larger number of deaths. That means investigating mortality over a longer period of time or from a larger area.

The first option, extending the study period over time, is problematic because it is difficult to obtain reliable population estimates (for the denominators of rates) for longer periods of time. The second option, extending the study over a larger area,

is feasible in theory. A study of mortality by country of birth in Metropolitan Toronto would probably yield reliable results.

Such a study would be limited in its usefulness, however, unless the Registrar-General begins to collect information on other ethnocultural indicators such as ethnic origin and length of residence in Canada. And it would still not be able to address questions about the role of psychosocial risk factors and socioenvironmental risk conditions.

CHAPTER THREE

AN ECOLOGICAL ANALYSIS OF MORTALITY

3.0 AN ECOLOGICAL ANALYSIS OF MORTALITY

3.1 Background

Ecological analysis is a common approach to the study of health status and risk conditions. As the term ecological suggests, it involves the study of these relationships in areas or neighbourhoods rather than in individuals. The census tract is typically the unit of analysis, since socioeconomic and ethnocultural data are widely available at the census tract level. In this chapter, we report the results of an ecological study of the relationship between mortality and socioeconomic status and some aspects of ethnicity in the City of Toronto.

In their recent study of mortality and income in urban Canada, Wilkins, Adams and Brancker summarized the relevant research in this area as follows: "In Canada, a small but growing number of studies have documented inequalities in mortality among socioeconomic groups. These include cross-sectional studies of occupational mortality, national ecological studies based on neighbourhood and similar studies within individual urban areas, studies of native Indian and Inuit mortality, follow-up studies to national health and labour force surveys, infant death to birth linkage studies, a retrospective cohort study of mortality by income among contributors to the Canada Pension Plan, and two provincial longitudinal studies on aging." (pp.138-9)

The only local studies of mortality and socioeconomic status to date have employed an ecological approach (Wilkins et al., 1990). This approach is notorious for leading to the ecological fallacy, that is, the assumption that relationships that appear to exist at the ecological level necessarily exist at the individual level. Census tracts with a lot of poverty may have high mortality rates but we cannot infer from that fact that individuals who are poor have high mortality rates. We can, however, say that poor areas have high mortality rates based on an ecological analysis, and that is the approach we have taken.

3.1.1 The Contextual Approach

The focus throughout this chapter is on contextual properties such as poverty and culture: we cannot say on the strength of this analysis whether being poor is a risk condition (although other studies have done so), but rather that living in a poor area may be detrimental to your health. Common sense suggests that this is more likely the case if you are poor than if you are affluent; indeed, there is good evidence that living in a poor area adds to the burden of being poor (Offord, 1989).

In the previous chapter we reported some findings that suggest Toronto residents born outside Canada live longer than those born in Canada: in this chapter we ask whether living in a so-called "ethnic" area is healthier. Again, we suspect that whatever beneficial role culture may play, it is more pronounced when an individual member of a particular ethnocultural group lives in an area that is heavily populated by that group.

In methodological terms, the problems of aggregation bias and specification bias in ecological analysis are both minimized by a contextual approach (Dogan & Rokkan, 1969).

The importance of contextual variables such as poverty and culture is best illustrated by an individual-level prospective study, the Alameda County study. The mortality experience of a random sample of residents of Oakland, California aged 35 and older was studied over a nine-year period. Age, race and sex-adjusted mortality for individuals living in a federally-designated poverty area was compared with the mortality of individuals living in non-poverty areas: residents of the poor area had a relative risk of dying 1.2 to 2.4 times higher than residents of non-poor areas. The disparity persisted when adjustments were made for health status, psychosocial and behavioural risk factors, and socioeconomic status, including income -- at the individual level of analysis. Living in a poor area was, in itself, a risk condition (Haan et al., 1987).

The recent Wilkins et al. ecological study mentioned above has documented the relationship between mortality and neighbourhood income in large urban areas in Canada, including the Toronto Census Metropolitan Area (which consists of Metro Toronto and the regions of York, Durham, Halton and Peel). Census tracts were characterized as neighbourhoods in the study, and the authors make it clear that their findings apply to these areas, not to individuals. They found significant improvements in mortality indices from 1971 to 1986, with the most significant gains occurring in poorer neighbourhoods. However, significant disparities by income level still persist.

In many respects, our study is a replication at the local level of Wilkins, Adams and Brancker's work. It is much less ambitious in the range of mortality indices employed, however, and more ambitious in its exploratory approach to modelling the relationships among other socioeconomic and ethnocultural variables and mortality. With the exception of studies on native health (D'Arcy, 1988), there has been little attempt in Canada to study the relationships between ethnocultural variables, socioeconomic status, and health status. This study is a very tentative first step in that direction.

3.1.2 Social Change in City of Toronto Neighbourhoods

A crucial assumption underlying the study is that areas that were poor two decades ago are still relatively poor today. Any study of the relationship between poverty and mortality must in some sense be retrospective. It is the cumulative experience of a lifetime of poverty that influences health status. We are not assuming that the individuals who died in poor areas of Toronto during the study period had lived there all their lives but rather, that these areas have historically been poor.

Given the amount of social change that has occurred in the inner city areas of Canadian cities on recent years (Ram, 1989), it seemed doubtful initially that this assumption could be met. Three out of four census tracts in the City of Toronto are considered to be inner-city. We used data compiled by social geographer David Ley on changes in the social status of Toronto census tracts from 1971 to 1986 to assess the amount of change in poor areas. Ley uses a combination of changes in education and occupational status to define an area's social status (Ley, 1985; 1988).

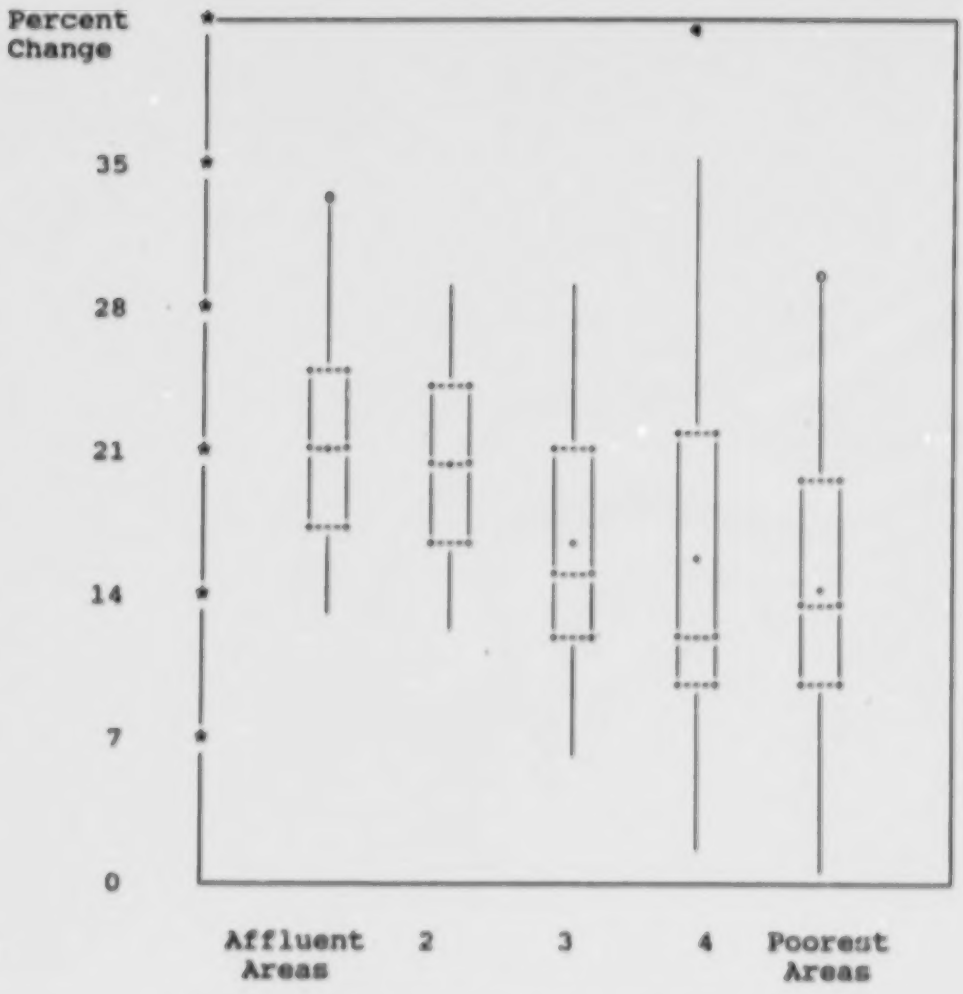
In relative terms, areas that were poor in 1986 (during the study period) experienced more social change from 1971 to 1986 than more affluent areas; in absolute terms, however, poorer areas experienced less social change. In other words, because poorer areas started with lower social status, they experienced a larger increase than more affluent areas relative to their starting point. The absolute difference between 1971 and 1986 was greater in more affluent areas, however. The net result is that poor areas are still poorer, and more affluent areas are still more affluent. **Figure 3-1** shows that despite the overall dramatic increases in social status in the City, some areas experienced no increase at all.

Census tracts are rank ordered in Figure 3-1 in terms of the percent of their population living below the poverty line from highest to lowest percent, then divided into quintiles or fifths. The most affluent quintile of census tracts is shown on the left, the poorest quintile on the right. The vertical axis represents the absolute amount of socioeconomic change according to Ley's index.

In each quintile, half of the census tracts fall within the range indicated by the box; the tails represent the remainder of census tracts with the o representing extreme cases. The line dividing the box represents the median census tract and the plus sign represents the mean for the quintile (mean and median coincide for the two most affluent quintiles).

FIGURE 3 - 1

SOCIOECONOMIC CHANGE
IN CITY OF TORONTO NEIGHBOURHOODS
1971 - 86



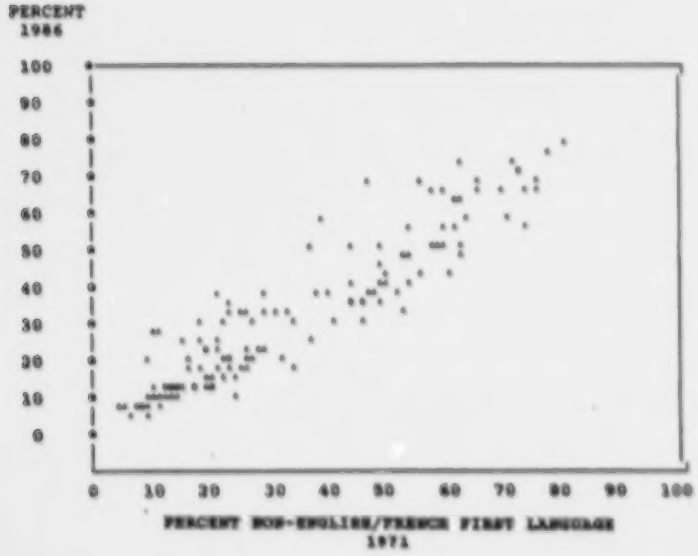
Reading from left to right, we see that the average amount of socioeconomic change decreases as the amount of poverty increases. But the range increases: there is little variation in the amount of absolute change in the most affluent quintile of census tracts and considerable variation in the poorer quintiles. This fact must temper our conclusions about the mortality experience of poor areas because some poor census tracts experienced a great deal more change than others.

The overall picture of socioeconomic disparity shown in Figure 3-1 was highlighted in a recent study commissioned by the Department of Planning and Development on residents of the Central Area (City of Toronto, 1989c). Nearly 6,000 housing units have been built in the Central Area of the City since the 1986 census. The Central Area Residents' Survey found that "generally, the residents of Toronto's downtown are younger and better educated than the residents of outer neighbourhoods ... (but) the poor live downtown too ... ". And "while this profile has probably been true of much of the inner-city population for some time, many of the most distinguishing characteristics have been reinforced by recent migration patterns, changes in employment opportunities and housing opportunities." (p. 7)

The study required a similar assumption about ethnocultural change: if ethnicity is associated with mortality it is because of a lifetime of cultural beliefs and practices. Figure 3-2 indicates that the proportion of population with non-English or

FIGURE 3-2

ETHNOCULTURAL CHANGE
IN CITY OF TORONTO NEIGHBOURHOODS
1971 - 86



French first language has changed very little in any given census tract. Each symbol in Figure 4-2 represents the position of one or more census tracts on the vertical (1986) and horizontal (1971) axes. The symbol A indicates that one census tract occupies a given position, B indicates that two census tracts occupy a given position, and so on. Areas that had a large ethnic makeup in 1971 typically did so in 1986 as well, although their specific ethnic composition may have changed. Given the fact of ethnic residential segregation in large Canadian cities (Balakrishnan and Selvanathan, 1990), this stability is not surprising.

3.2 Data and Methods

3.2.1 Mortality and Census Data

A mortality database has been maintained by the Department of Public Health since 1979. It is described in detail in chapter two. This database includes records of all deaths that occur for residents of the City of Toronto. For the purpose of ecological analysis, this database had to be made compatible with census indicators that are reported only for private households. This meant identifying records where deaths had occurred to permanent residents of certain health care institutions so that they could be excluded from the analysis.

For this purpose, Statistics Canada made available a list of the addresses of certain types of health care institutions in the City of Toronto, specifically special care homes and institutions for the chronically ill, hospitals, psychiatric institutions, and treatment centres and institutions for the physically disabled. This list was updated from Ministry of Health and Metro Social Services sources and the complete list of addresses was used to identify deaths that occurred to permanent residents of these institutions. These records were then deleted from the mortality database.

Since the calculation of standardized mortality indices requires the use of data on the age and sex structure of the population in each of the 142 census tracts in the City of Toronto, these data were also obtained for the non institutional population. The population data prepared by Statistics Canada for the 1990 Wilkins et al. study was obtained from the Canadian Center for Health Information (CCHI) for this purpose. These data exclude residents of the health care institutions mentioned above.

During the five-year study period, 1984-88, a total of 25,485 Toronto residents died. Figure 3-3 shows the distribution of these deaths by major chapters of the International Classification of Diseases, 9th revision (ICD-9). Fourteen

FIGURE 3-3

CAUSE OF DEATH
City of Toronto, 1984-1988

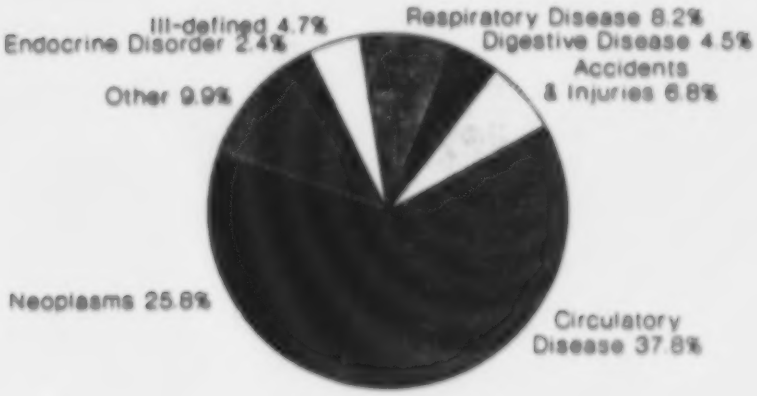
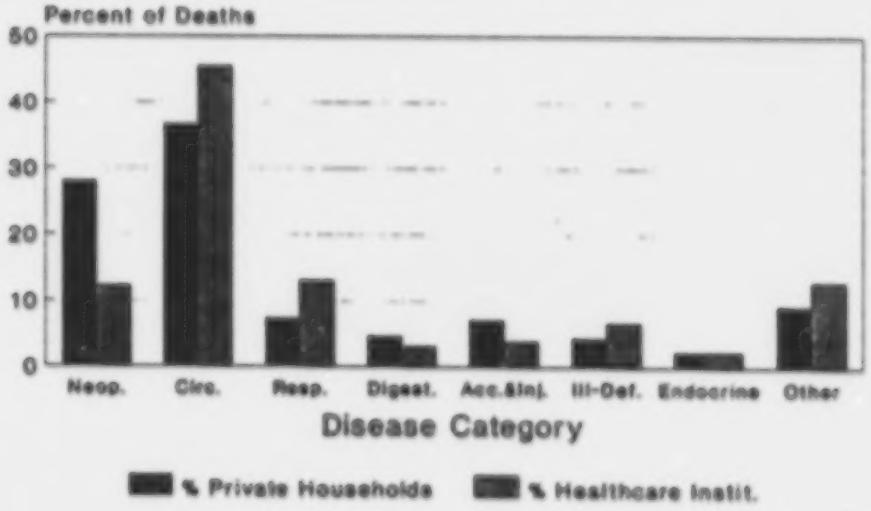


FIGURE 3-4

CAUSE OF DEATH BY PLACE OF RESIDENCE
City of Toronto, 1984-1988



percent of these deaths were excluded from the analysis by the above procedures, leaving a database of 21,992 deaths.

Figure 3-4 compares the distribution of deaths by ICD-9 chapter that occurred in non institutional settings (the study database) with deaths for permanent residents of health care institutions (which were excluded). For all practical purposes, non institutional settings refers to private households. In statistical terms there are significant differences in the profile of cause of deaths for those that occurred while the decedent was a permanent resident in an institution and those that occurred while the decedent still maintained a private residence.

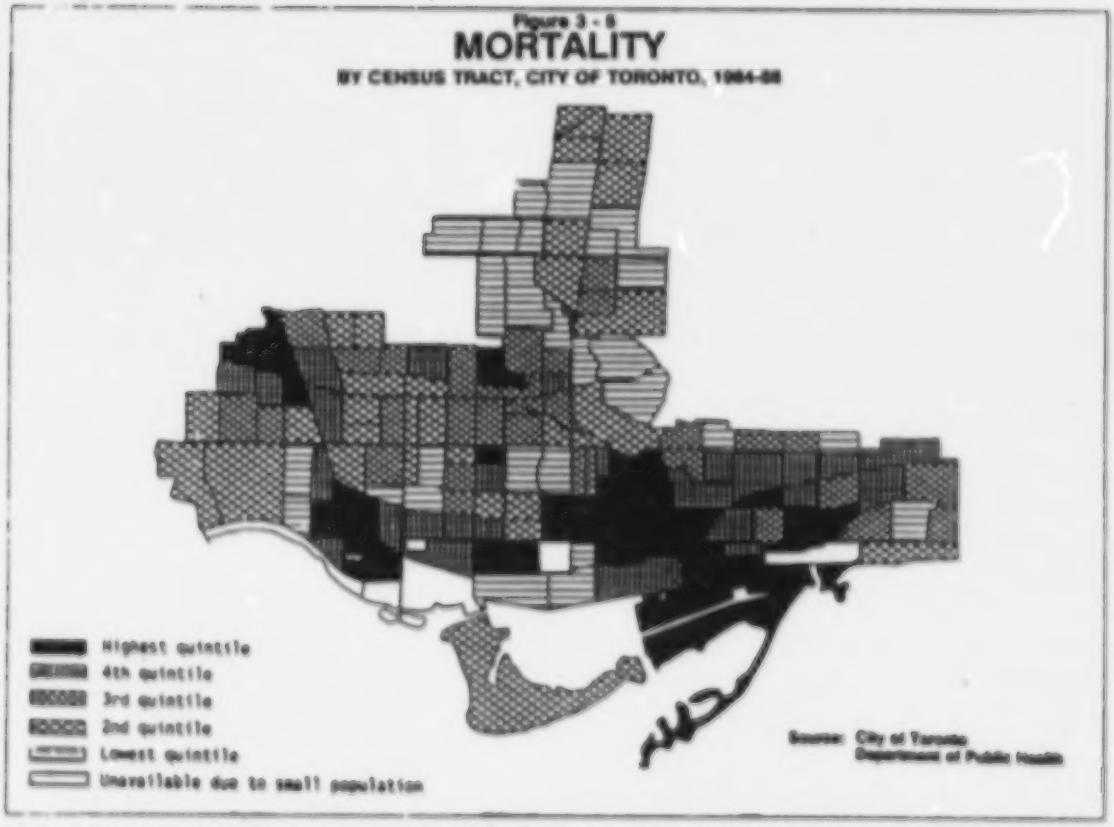
Excluding institutional deaths from the study database has the effect of reducing the proportion of deaths due to circulatory disease to 36.7 percent, respiratory disease to 7.4 percent, symptoms, signs and ill-defined conditions to 4.4 percent and other causes to 9.4 percent. It increases the proportion of deaths due to neoplasms to 28.1 percent, diseases of the digestive system to 4.7 percent and deaths due to accident and injury to 7.2 percent.

Data for socioeconomic and ethnocultural variables were drawn from the 1986 census. As indicators of the City's present social character these data are now somewhat out of date, but they provide a useful profile of the City's population at the mid-point of the four-year study period. Census data on low income actually refer to 1985 household incomes. Census data were obtained from the published census Profile for Toronto (Statistics Canada 1988b) and from machine-readable basic summary tables maintained by the Planning and Development Department.

Seven census tracts that were split in two for the 1986 census were recombined for this analysis. Of the resulting 142 census tracts that make up the City of Toronto, seven were excluded from the analysis because they had a population less than 500 in 1986. One (census tract 16) was excluded from the analysis because it experienced a thousand-fold change in the index of social status described earlier. There were thus 134 census tracts, or cases, in the analysis (see Appendix A).

3.2.2 Measures

Directly standardized mortality rates (DSRs) were calculated for each census tract for males and females and for both sexes combined. This method adjusts for the age (and sex) structure of



the census tract by standardizing to the age (and sex) structure of the City as a whole. Hereafter, the reader may assume that any reference to mortality rates is to age-standardized rates for males and females and age and sex-standardized rates for both sexes combined. The abbreviations DSR, DSRM and DSRF will also be used.

Figure 3-5 shows the pattern of mortality rates for both sexes combined from all causes of death. Census tracts were rank-ordered from highest mortality (15.6) to lowest (2.2) and then divided into quintiles (or fifths); the quintiles are shown on the map with the darkest shading representing the quintile of census tracts with the highest mortality rates, and so on. The median mortality rate was 7.2, that is, half of the census tracts in the study had mortality rates higher than 7.2 and half were lower.

Mortality rates were calculated for major ICD-9 chapters and for the top 20 specific causes of death in the City of Toronto in 1988 (City of Toronto 1989b), except where there were so few deaths that one-third or more of census tracts experienced no mortality from that particular cause during the study period. These indices are summarized in **Table 3-1**.

The outcome measures include all of the major ICD-9 chapters and account for 98 percent of deaths recorded in the database. Rates were calculated for major categories such as circulatory disease, for example, and also for more specific causes where numbers permitted. Thus, we calculated rates for mortality due to ischemic heart disease (which includes myocardial infarction or heart attack) and for heart attack as well.

Five social indicators were derived from 1986 census data: two ethnocultural indicators and one for each of the dimensions of socioeconomic status, namely income, education and occupation.

As we saw in chapter two, census data make possible the use of a number of specific ethnocultural indicators. But the very fact of multiculturalism in the City of Toronto makes difficult the use of any specific ethnocultural indicator in this type of analysis. Because there are so many different groups, the size of any one group is too small, when distributed across 134 census tracts, to permit any meaningful statement to be made about statistical associations.

Consequently, we selected two summary variables. The first, first language, is a measure of the percent of population in each census tract that first learned and used a language other than English or French. Census tracts in the City vary from 5.3 to 76.8 percent on the first language indicator, a substantial variation in terms of the ethnic character of an area. Because of the ethnocultural diversity within heavily ethnic areas, however, this is a weak indicator of acculturation.

The second ethnocultural variable is a measure of the percent of the population that emigrated to Canada between 1983-86, that is, in the period immediately prior to the census. Census tracts vary from 0 to 12.4 percent on the recent immigrant status indicator.

Figure 3-6 shows the distribution of non-English/French first language in census tracts. Again, they are rank-ordered from highest to lowest percent and divided into quintiles, with the highest quintile of census tracts shaded darkest, and so on.

There were two reasons for our decision to select separate indicators for each of the three dimensions of socioeconomic status rather than create an index. Each dimension may have different implications for health (MacIntyre, 1986) and we are concerned, in part, to explore their relative impact. Our use of multivariate techniques, described below, makes it possible, in effect, to empirically combine indicators in the analysis.

TABLE 3-1

OUTCOME VARIABLES USED IN ECOLOGICAL ANALYSIS

CAUSE OF DEATH*	ICD-9 CODE(S)	N°
All Causes	01-999	21,992
Neoplasms	140-239	6583
Cancer of Lung & Trachea	162	1575
Cancer of Female Breast	174	613
Cancer of Colon & Rectum	153 & 154	702
Diabetes Mellitus	250	376
Circulatory Diseases	390-459	9630
Ischemic Heart Disease	410-414	5607
Myocardial Infarction	410	2864
Cerebrovascular Disease	430-438	1860
Acute CVD	436	1095
Respiratory Diseases	460-519	2085
Pneumonia	480-486	1007
Chronic Obstructive Lung Disease	490-493, 496	765
Diseases of Digestive System	520-579	1140
Chronic Liver Disease & Cirrhosis	571	417
All other Digestive Diseases	520-570, 572-579	723
Accidents and Injuries	800-999	1722
Excluding Motor Vehicle	800-809, 820-999	1503
Falls	880-888	396
Suicides	950-959	525

* Males, females and both sexes combined for each cause except female breast cancer

° Number of deaths in City of Toronto, 1984 - 88, residents of private households only

Composite indices have thus lost much of their appeal with the advent of these new techniques (Liberatos, 1988).

The concept of risk conditions dictates our approach to the socioeconomic status indicators of income, education and occupation. We are not concerned with measuring income per se but rather inadequate income, that is, poverty (DPH, 1987). The best available indicator, and one that lends itself well to an ecological approach is the percent of the population below the low-income cut-off. As defined by Statistics Canada, the low income cut-off is the point below which a person lives in "straitened circumstances." The cut-off points are determined on the basis of a series of estimations from Family Expenditure Survey data and vary for households and communities of different size (Statistics Canada, 1988).

The low income cut-off has been widely criticized as a measure of poverty. (Ross and Shillington, 1989; Wolfson and Evans, 1989). Nonetheless, it seems to have a measure of validity in Toronto. Community Health Officers from the Department of Public Health assessed the map shown in Figure 3-7 that portrays the distribution of poverty according to this indicator and concluded that it reflects quite well the poor areas that they know from field experience.

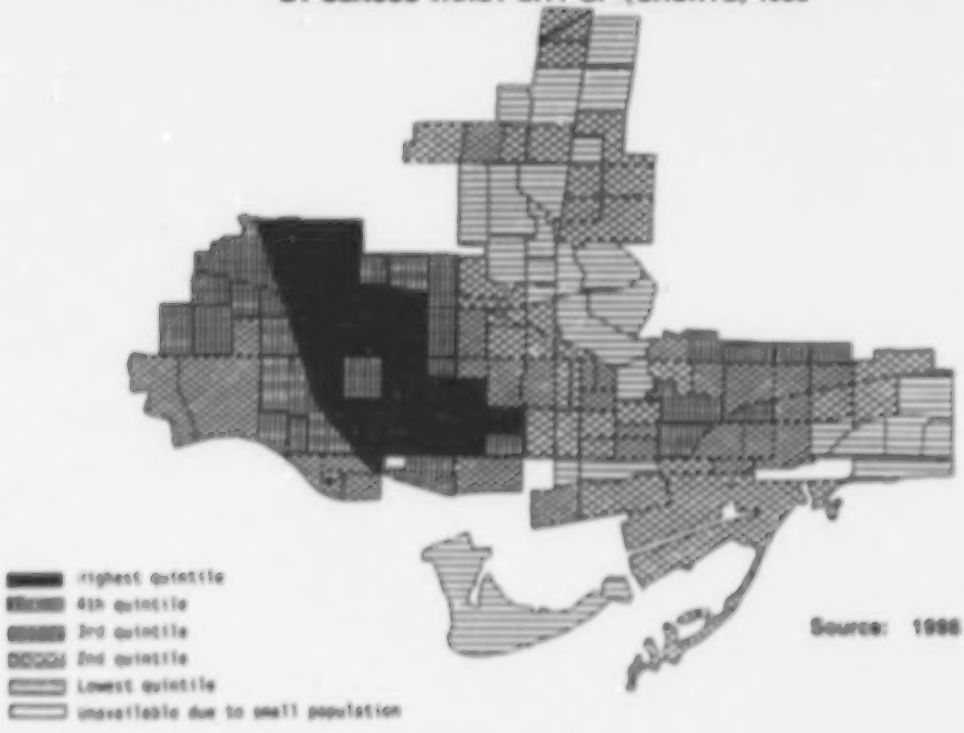
Census tracts vary from 2.4 to 72 percent in the amount of poverty they contain. Any attempt to establish a threshold above which an area is considered poor would be arbitrary, so we have simply ranked census tracts according to their percent of low income population and then divided them into quintiles or fifths. The highest quintile of census tracts in terms of percent low income is then referred to as poor in the bivariate analysis that follows. In the multivariate analysis, we treat percent low income as a continuous variable.

Occupational status and educational level are treated the same way. Occupational status is probably the weakest social indicator: it is simply a measure of the percent of persons employed, at the time of the census, in managerial, administrative or related occupations. At best, it is a proxy indicator for the risk condition of low occupational status. From a sociological point of view, occupational status is a measure of the amount of discretion a person has in their work. A complete scale of occupational status would include several gradations and we have collapsed these into what is essentially a dichotomous variable. This indicator tends to be highly correlated (at the census tract level) with low income so that it was of limited value in the analysis. Census tracts vary from less than one percent to 36 percent in their extent of high status occupations (Figure 3-8).

Figure 3 - 6

NON-ENGLISH OR FRENCH FIRST LANGUAGE

BY CENSUS TRACT CITY OF TORONTO, 1986

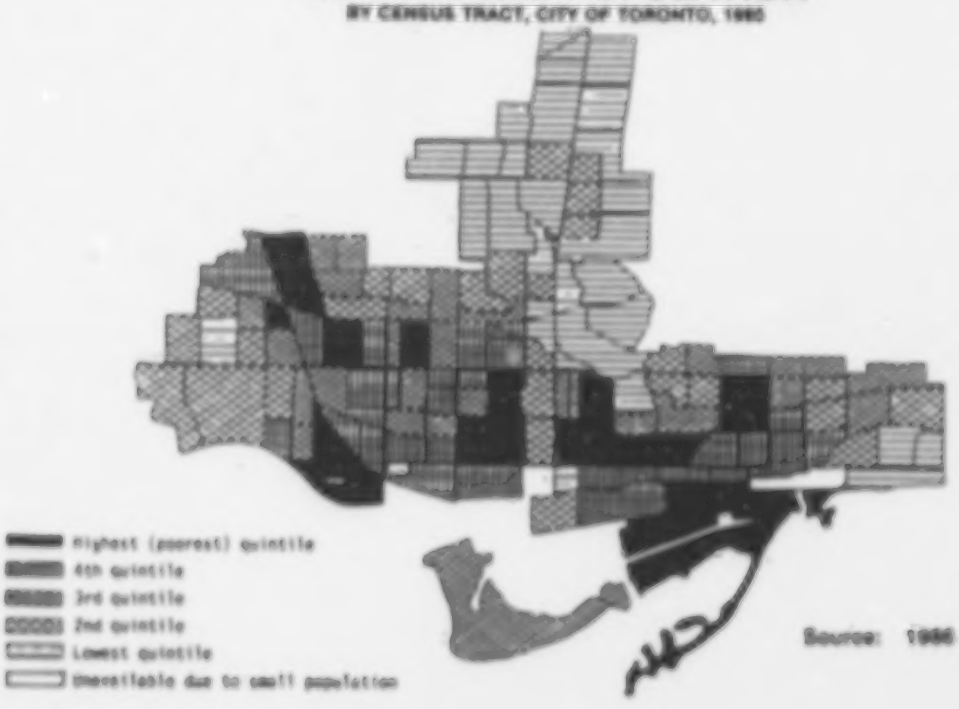


Source: 1986 Census

Figure 3 - 7

LOW INCOME POPULATION

BY CENSUS TRACT, CITY OF TORONTO, 1986



Source: 1986 Census

For low level of educational attainment we selected as an indicator the level, some secondary education or less. The assumption here is that a secondary diploma indicates the completion of the minimal amount of formal education required to function effectively in today's complex society. The ecological correlation is quite high between this indicator and occupational status and moderately high between educational level and low income. It is also highly correlated with first language and somewhat correlated with immigration status and of course, it is correlated with age. As the analysis makes clear, however, it appears to be measuring a distinct phenomenon. Census tracts vary from 7.8 to 79.6 percent in proportion of their population aged 15 and older with low levels of educational attainment (Figure 3-9).

3.2.3 Methods

The analysis proceeded in two stages. In the first stage, bivariate analysis of the association between low income and standardized mortality rates was carried out. For this analysis, the low income variable was categorized into quintiles as described above. Because there is considerable variation among census tracts in each low income quintile, median DSRs were then calculated for each quintile. A ratio of the highest (poorest) to lowest (most affluent) quintile was then constructed from the median DSRs. This ratio is reported as a measure of relative mortality.

Percent low income was then regressed on the various mortality indices using simple linear regression to estimate the magnitude of their association. Ecologic regression is preferable to ecological correlation for this task because it minimizes the effects of aggregation bias (Morgenstern, 1982).

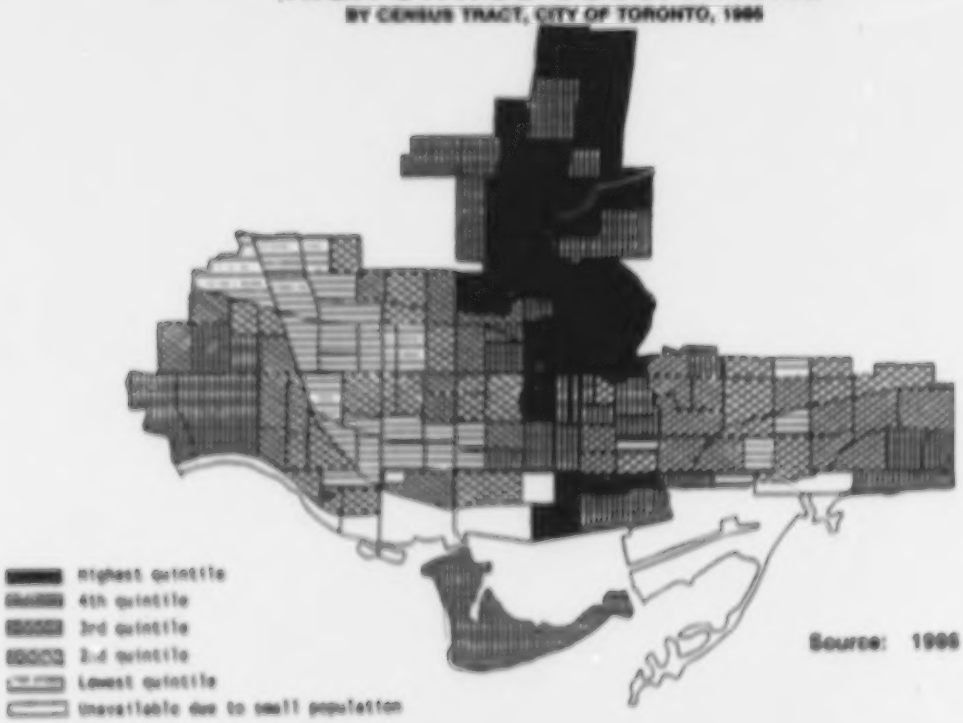
Multivariate analysis of the full set of socioeconomic and ethnocultural variables was then performed. Ordinary least squares regression techniques were used to evaluate various combinations of the five variables. Weighted least squares was considered, but examination of residuals determined that it was not necessary.

A model was thus created for each of the mortality indices. The term model is used here in both the statistical sense and in the everyday sense: it is a simplified representation of reality. The question then is how well the model represents or 'fits' reality, in this case, the reality that is evident in the data. The conventional diagnostic statistics available in SAS (Statistical Analysis System) were used to assess the adequacy of each model.

Figure 3 - 8

HIGH STATUS OCCUPATIONS

BY CENSUS TRACT, CITY OF TORONTO, 1986

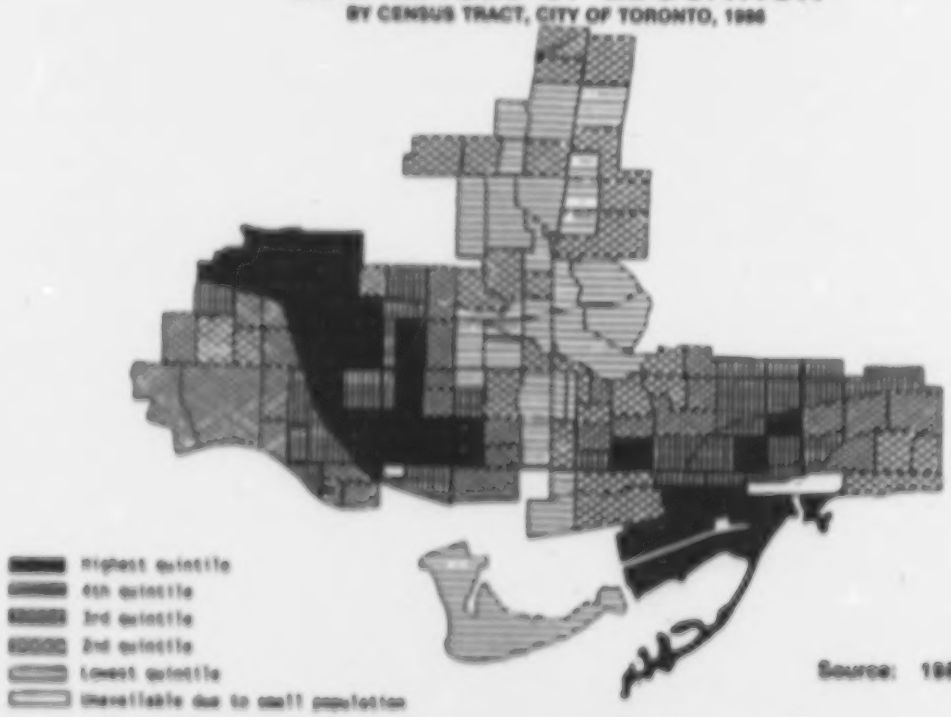


Source: 1986 Census

Figure 3 - 9

LOW LEVELS OF EDUCATION

BY CENSUS TRACT, CITY OF TORONTO, 1986



Source: 1986 Census

One of the advantages of regression analysis is that it makes clear the effect of unusual cases on the results. In the course of the analysis several census tracts with unusually high mortality rates were identified. One of these (census tract 16) was eliminated from the analysis because it experienced so much social change in recent years that any apparent association between mortality and social indices would be unreliable.

Two others, census tracts 11 and 35 also had unusually high DSRs for several causes of death. They may well have experienced the same degree of social change since 1986, given their locations (Appendix A). Census tract 11, in particular, is the west-side mirror of east-side census tract 16: both are older industrial areas close to downtown. The area may contain illegal housing so that census population data may be unreliable. We have no objective basis for these observations, however, so have included both census tracts in the analysis. They had a moderate dampening effect on the regression coefficients.

We mention these particular census tracts only because their mortality rates may be unreliable. In general, we avoid any reference to the association between socioeconomic status or ethnicity and mortality in specific census tracts. The mortality experience of any specific census tract is a function of several conditions -- social and physical, and it would be foolhardy to attribute it to any one factor or condition. What we are looking for are **patterns**, that is, whether socioeconomic status (especially poverty) and ethnicity are associated with mortality rates in a consistent way across all of the census tracts in the City of Toronto.

3.3 Results

3.3.1 Relative Mortality

Table 3-2 shows the relative mortality by income for each outcome measure. Relative mortality here is simply the ratio of the median mortality rate in the poorest quintile to the median rate in the most affluent quintile of census tracts. With few exceptions, mortality was higher in the poorest census tracts during the study period. For all causes of death for males and females combined, mortality was 1.5 times higher in the poorest areas of the City, compared with the most affluent areas.

The disparity was most pronounced for diabetes, with a relative mortality of 3.0 and for accidents and injuries, where the mortality rate for both sexes combined was 2.2 times higher in the poorest quintile of census tracts. This disparity is reduced slightly when motor vehicle accidents are excluded. Mortality

TABLE 3-2

RELATIVE MORTALITY* BY CAUSE OF DEATH
City of Toronto, 1984-88+

CAUSE OF DEATH	MALES	FEMALES	TOTAL
All Causes	1.6	1.4	1.5
Neoplasms	1.4	1.0	1.2
Lung Cancer	2.1	1.3	1.7
Breast Cancer	-	0.8	-
Colon & Rectal	1.0	1.0	1.0
Diabetes Mellitus	NA	NA	3.0
Circulatory Disease	1.4	1.3	1.4
Ischemic Heart Disease	1.7	1.5	1.4
Myocardial Infarction	1.6	1.3	1.4
Cerebrovascular Disease	1.3	1.2	1.2
Acute Cerebrovascular	1.3	1.2	1.4
Respiratory Disease	2.0	1.5	1.7
Pneumonia	1.7	1.1	1.5
COLD	2.7	NA	2.1
Diseases of the Digestive System	1.8	1.8	1.6
Chronic Liver Disease & Cirrhosis	3.5	NA	2.9
Other Digestive Diseases	2.1	1.5	2.6
Accidents and Injuries	2.0	2.2	2.2
Excluding Motor Vehicle	2.0	2.2	2.0
Falls	NA	NA	1.4
Suicides	1.5	NA	2.0

* Q5/Q1 where Q5 = poorest quintile and Q1 = most affluent quintile of census tracts
\+ Residents of private households
NA Not available due to small numbers

from falls was 1.4 times higher in the poorest areas and the suicide rate was twice as high.

The mortality rate in poor areas was 1.7 times higher for respiratory diseases in general and 2.1 times higher for chronic obstructive lung diseases, in particular. The mortality rate for pneumonia was 1.5 times higher in poor areas. The disparities were conspicuously higher for men for respiratory diseases in general and for pneumonia.

Relative mortality for diseases of the digestive system was 1.6. The disparity was substantial for chronic liver disease and cirrhosis of the liver, as other studies have shown, but it was nearly as high for all other digestive diseases combined, as well.

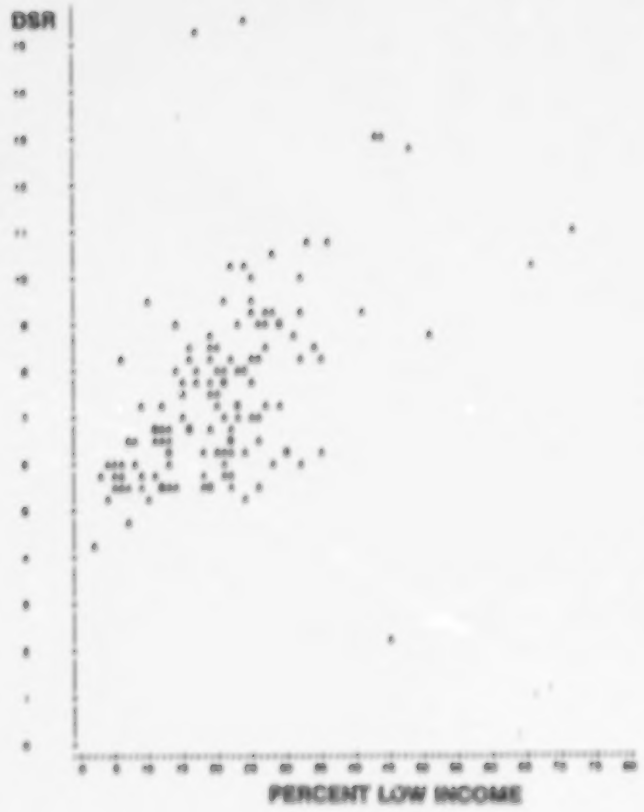
For circulatory diseases, the relative mortality overall was 1.4, with disparities in ischemic heart disease generally and myocardial infarction (heart attack) in particular as well as acute cerebrovascular disease (stroke) contributing to this result. In each case the differences were more pronounced for men than for women.

Finally, we see that the overall mortality rate for neoplasms (all types of cancers) was 1.2 times higher in the poorest quintile of census tracts, relative to the most affluent quintile. Relative mortality from lung cancer was high for males (2.1) and there was also some disparity in deaths from lung cancer for females (1.3); but there were no differences for cancers of the colon and rectum and relative mortality for cancer of the female breast was lower in poor areas.

This measure of relative mortality essentially establishes the mortality experience of the most affluent areas of the City as the reference or base against which the experience of the poorest areas is compared. We assume that the mortality experience used as a basis for comparison is achievable and desirable and that is obviously the case. But what about the three income quintiles in the middle? To see whether there is a steady gradient of increases in mortality rate as the amount of poverty in an area increases, we undertook a regression analysis. This technique also enabled us to determine the role of ethnocultural and other socioeconomic variables.

FIGURE 3-10

MORTALITY FROM ALL CAUSES AND LOW INCOME
FOR BOTH SEXES
CITY OF TORONTO CENSUS TRACTS, 1984 - 1988



3.3.2 Mortality From all Causes: Creating a Model

We begin by trying to create a model or mental picture of the association between mortality and income. Figure 3-10 shows the data for deaths from all causes for both sexes. Each symbol represents one or more census tract. The position of each symbol on the vertical axis indicates that census tract's mortality rate; its position on the horizontal axis represents the amount of poverty in the area. A line can be drawn through the data to represent the association between these two variables. If the line represents the data fairly accurately, it can be called a model. Ordinary least squares regression is simply a technique for "fitting" the best line to the data, and then for assessing how well it fits, that is, whether it is a good model.

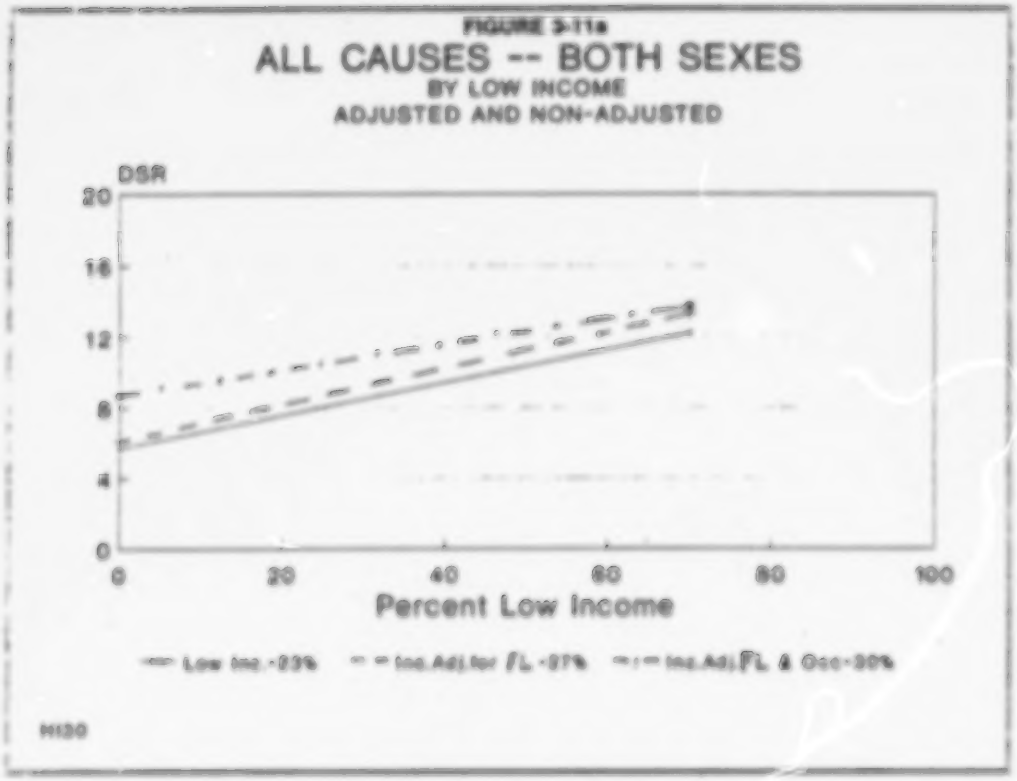


Figure 3-11a represents the association between mortality and income for the data shown in Fig. 3-10. The vertical axis represents the predicted mortality rate (DSR stands for directly standardized rate). The horizontal axis represents the actual amount of poverty. The bottom line represents the predictions we would make about mortality in a census tract if the only information we had about that area was the amount of poverty there. This is the best model we could fit to the data under this condition.

The legend for this model indicates that it explains 23 percent of the variance; this number, usually referred to as R^2, tells us how well our predictions (the bottom line, or model) fit the actual data. If the line fits the data perfectly, that is if the dots themselves formed a straight line, it would explain 100 percent of the variance.

The amount of variance explained is one of the criteria for determining how well a model fits. We will present results only for models that explain 10 percent or more of the variance. To put it another way, we present only those models that enable us to predict with at least that much certainty the mortality rate

of an area, given some knowledge of its socioeconomic and ethnocultural makeup. All of the models presented meet at least the .05 level of statistical significance. The intercept and parameter estimates for the models are included in Appendix B.

To summarize: the lines represent the predicted values for mortality as the amount of poverty in an area increases; R^2 tells us how certain we can be of our prediction.

The middle line in Figure 3-11a shows the association between mortality and income adjusting for first language. The effect of adding this variable to the model is to increase both the height and the slope of the line slightly, and to increase the variance explained to 27 percent. In other words, if we control for first language, the association between mortality and income is strengthened.

One of the consistent results in all of the models we present is that as the percentage of non-English/French first language increases, mortality rates decrease. This is consistent with the findings in chapter two. In practical terms, this means that poor areas where the majority of residents have English or French as their first language will have higher mortality rates than poor non-English/French areas.

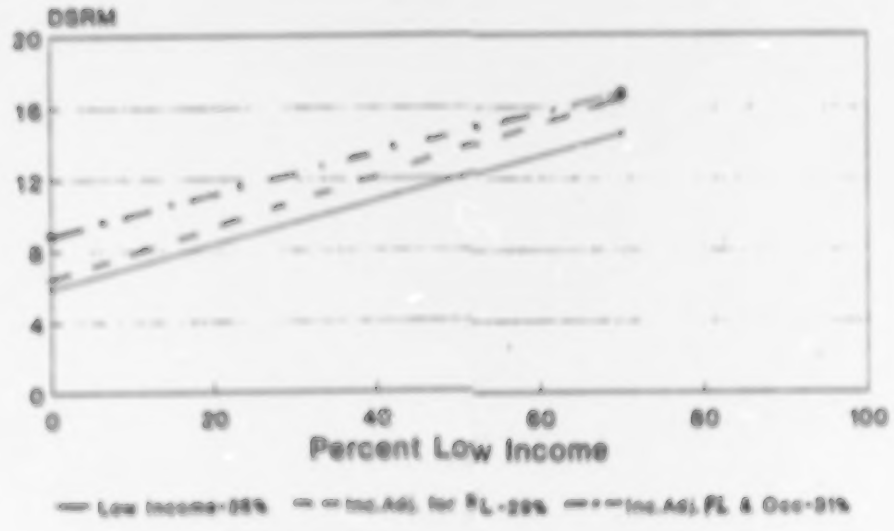
The best model for mortality from all causes for both sexes has three variables: income, first language and occupational status. This model explains 30 percent of the variance in the data. The top line in Fig. 3-11a shows that the effect of adding occupational status to the model is to increase the height and decrease the slope of the line that represents the association between low income and mortality. In other words, we predict higher mortality rates with this model, but they increase more gradually as the amount of poverty increases.

The measure of occupational status, the percent of persons employed in managerial, administrative and related occupations is, of course, inversely associated with the amount of poverty in an area, so that adjusting for this variable tends to reduce the slope of the line for low income whenever it appears in a model. However, by controlling for occupational status, however crudely, we reduce some of the variability in the data and this results in higher predicted values for mortality.

Similar patterns emerge when we consider all causes of death for males and females separately (Figures 3-11b & c), except that the predicted mortality rates for males increase more dramatically as percent low income increases, and the models for males fit the data much better. In practical terms this suggests that while income, occupational status and ethnicity have some bearing on

FIGURE 3-11b

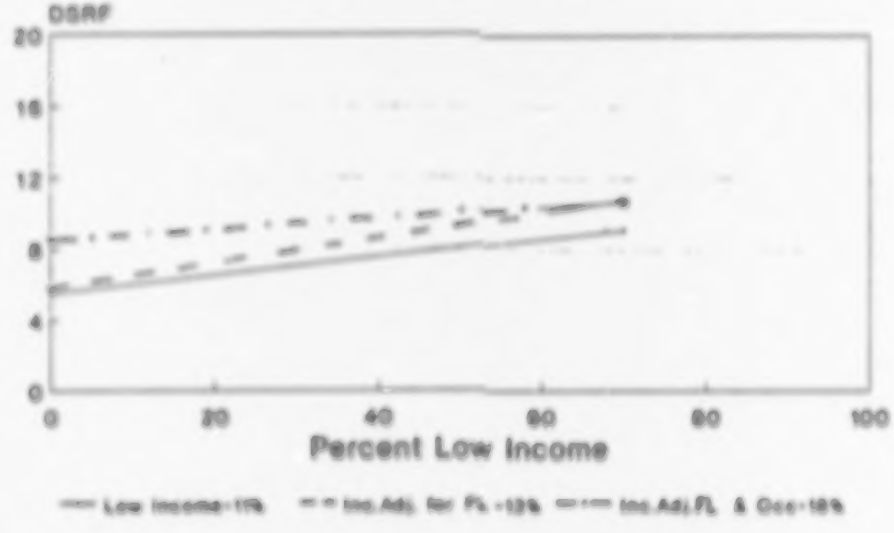
ALL CAUSES -- MALES
BY LOW INCOME
ADJUSTED AND NON-ADJUSTED



H181

FIGURE 3-11c

ALL CAUSES -- FEMALES
BY LOW INCOME
ADJUSTED AND NON-ADJUSTED



H182

women's health status, they are considerably more important for men's health. We will return to this point, as it is a recurrent theme in the results that follow.

3.3.3 Specific Causes of Death

Figures 3-12 through 3-20 present predictive models of the association between income and mortality for major ICD-9 chapters and specific causes where we found significant results. Because the results for both sexes combined tend to summarize the results for males and females, they obscure some important differences. For this reason, and because the picture is already quite complex, we present the findings for males and females separately whenever the number of deaths permits, and not for both sexes combined.

Complete results of the multivariate regression analysis are included in Appendix B. Readers will find there some borderline cases of models that were statistically significant; we have been somewhat arbitrary in choosing to graphically portray only those models that explain 10 percent or more of the variance in the data.

Perhaps the most striking result in Figures 3-12 through 3-20 is the number of models where income alone (of the full set of socioeconomic and ethnocultural variables) provided the best predictions. Without exception this occurred only for men or for mortality indices where the relatively small number of deaths required combining the data for both sexes. Thus we see that income alone was associated for men who died from death due to cancers of the lung and trachea, ischemic heart disease in general and heart attack in particular, diseases of the digestive system and accidents and injuries. For both sexes combined, income alone was associated with cirrhosis.

In no case was income alone associated for females with any of the causes of death we studied. For women, the other socioeconomic status variables appear to be more important, although rarely as important as was income for men, and ethnocultural variables more often came into play. The picture was also more complex for men for all types of circulatory disease combined, for respiratory diseases and for deaths from accidents and injuries excluding motor vehicle accidents. It was also more complex for both sexes combined for suicide.

The pattern by cause of death can be summarized as follows (with technical elaboration of the findings in parentheses):

* Income was associated with mortality due to cancers of the lung and trachea for both men and women (Figure 3-12a & b). The association was considerably stronger for men; living in an "ethnic" area appeared to moderate the effects of poverty for women but not for men.

(For females, adjusting for first language increases the slope of the line for low income in the model. When level of education is taken into account, as well, the model is more accurate but the increase in the slope for low income is negligible. Since level of education and first language are highly correlated and the percent of variance explained is sensitive to the number of variables in the model, the top line is probably the best model for this outcome.)

* For men, mortality from all types of circulatory disease was associated with income; together, occupational status and first language appeared to mitigate the effects of poverty considerably (Fig. 3-13a).

(In all the graphs, the bottom line represents the association between income alone and the mortality outcome variable. The second line in Fig. 3-13a represents the association between income and the mortality rates for circulatory diseases adjusting for first language and occupational status; the association between income and mortality is strengthened in this model, although it diminishes somewhat as income increases.)

In practical terms, this means that mortality rates for circulatory disease in men were highest during the study period in poor areas that were predominantly anglophone and had very few people in high status jobs.

* Mortality from ischemic heart disease in men was strongly associated with income (Fig. 3-13b). Heart attack (MI) in particular was associated with income in men somewhat less strongly (Fig. 3-13c).

* Mortality from all types of circulatory disease in women was associated with level of education; living in predominantly non-English/French areas appeared to reduce the effects of lack of education and the lower the level of education in an area, the more beneficial the role of ethnicity (Fig. 3-14a).

(It is interesting to note that despite the high ecological correlation between education and first language, both conditions appear to play a role here.)

FIGURE 3-12a

CANCER OF THE LUNG AND TRACHEA-MALES
BY LOW INCOME

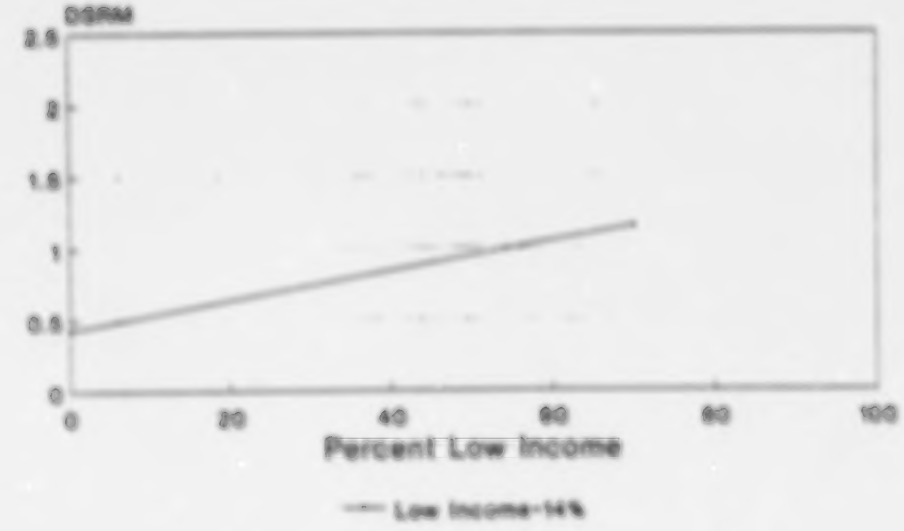


FIGURE 3-12b

CANCER OF LUNG & TRACHEA-FEMALES
BY LOW INCOME
ADJUSTED AND NON-ADJUSTED

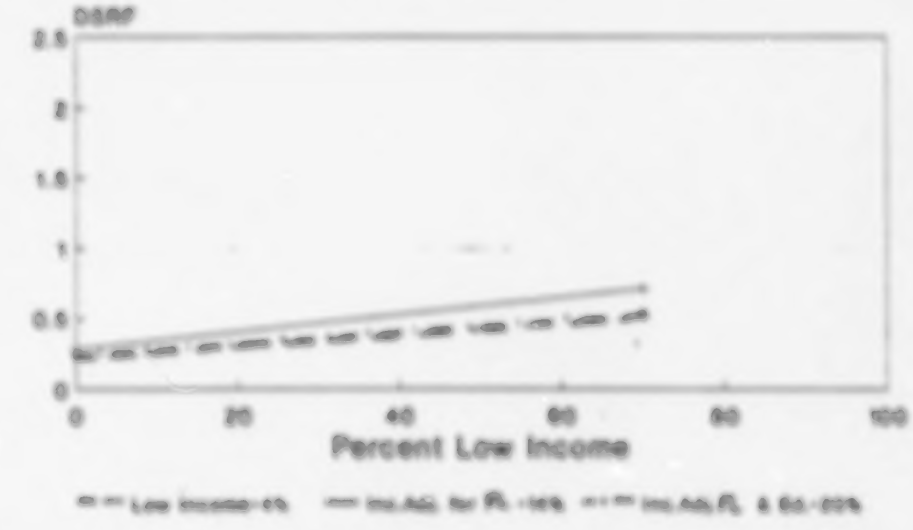
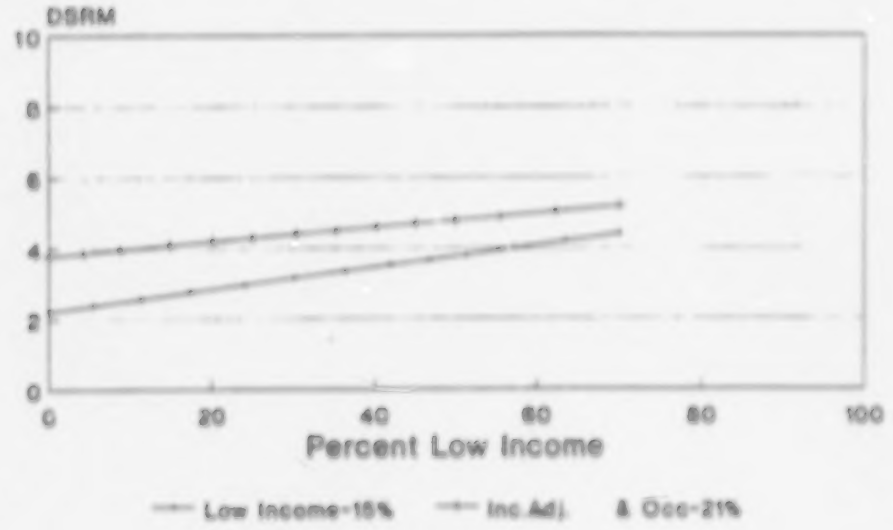


FIGURE 3-13a

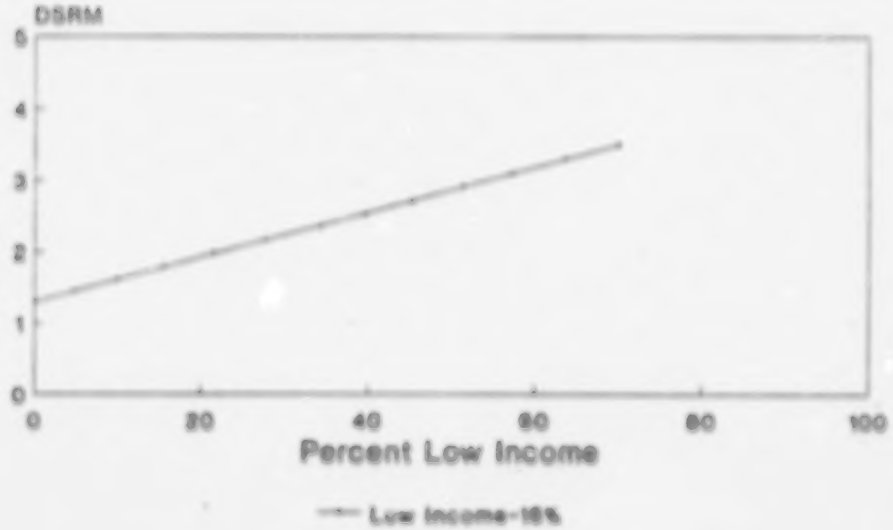
CIRCULATORY DISEASE-MALES
BY LOW INCOME
ADJUSTED AND NON-ADJUSTED



H136

FIGURE 3-13b

ISCHEMIC HEART DISEASE-MALES
BY LOW INCOME



H102

FIGURE 3-13a

MYOCARDIAL INFARCTION-MALES
BY LOW INCOME

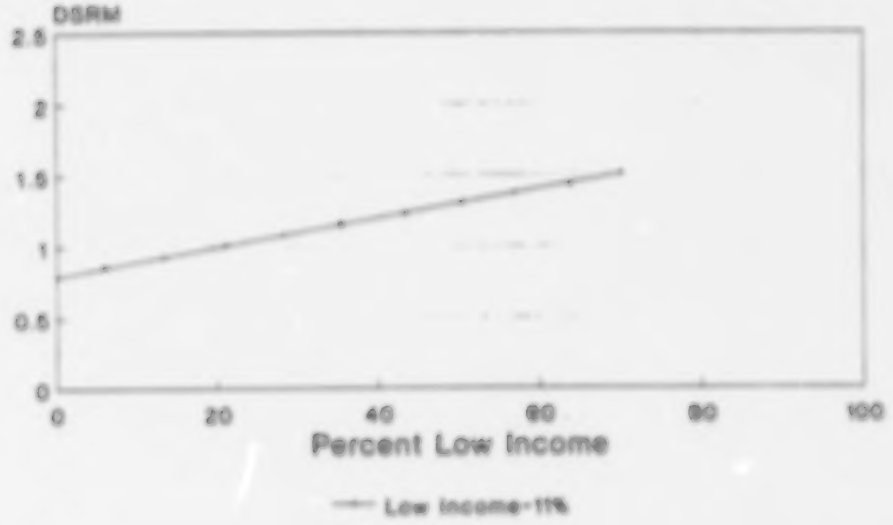
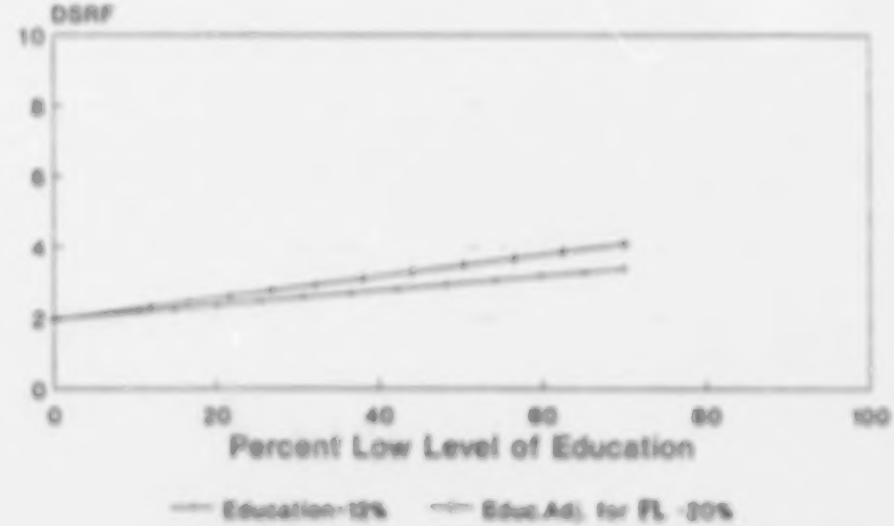


FIGURE 3-14a

CIRCULATORY DISEASE-FEMALES
BY LOW LEVEL OF EDUCATION
ADJUSTED AND NON-ADJUSTED



• For mortality due ischemic heart disease in women, level of education appeared to play the most important role; although living in an "ethnic" area, especially one with higher status occupations, mitigated the effects of low levels of education (Fig. 3-14b).

(The bottom line suggests that as the percent of the population with only some secondary education or less in an area increases, the mortality rate for IHD in females increases. The effect on the association between education and mortality of adjusting for first language, the middle line, is to substantially increase the slope of the line. Adjusting for occupational status as well has the effect of increasing the height of the line but not the slope.)

• Education alone was associated with mortality due to heart attack (MI) in women (Fig. 3-14c).

• Mortality from respiratory disease was associated with low income for men, although the model for low income alone does not meet our minimum requirement of 10 percent variance explained; it does so when adjusted for both education and occupation, however (Fig. 3-15). It appears that living in areas that rank low on all the socioeconomic indicators was associated for men with mortality from respiratory diseases.

• Mortality due to diseases of the digestive system was also associated with low income for men (Fig. 3-16).

(We have followed the convention of using a consistent scale of 0 to 10 on the graphs for major ICD-9 chapters; major categories within a chapter such as IHD are scaled 0 to 5 and specific diseases are scaled 0 to 2.5. In general, this makes it possible to compare the graphs, one with another. The low mortality rates for respiratory, digestive and accident and injury chapters reflect the fact that there were fewer deaths from these causes than from circulatory diseases. Looking at the graphs taken one at a time, therefore, it is the slope of the line that is important because it indicates the relative increase in predicted mortality rates as poverty, for example, increases.)

FIGURE 3-14b

ISCHEMIC HEART DISEASE-FEMALES

BY LOW LEVEL OF EDUCATION
ADJUSTED AND NON-ADJUSTED

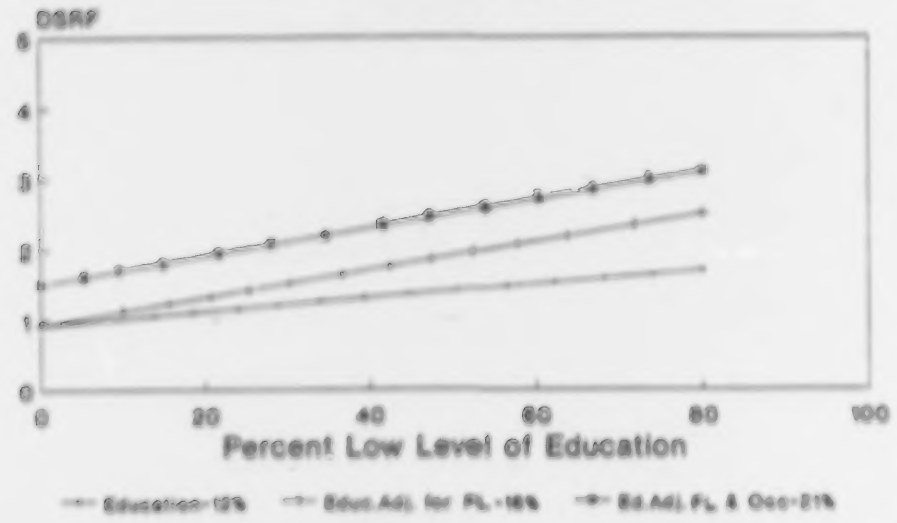


FIGURE 3-14c

MYOCARDIAL INFARCTION-FEMALES

BY LOW LEVEL OF EDUCATION

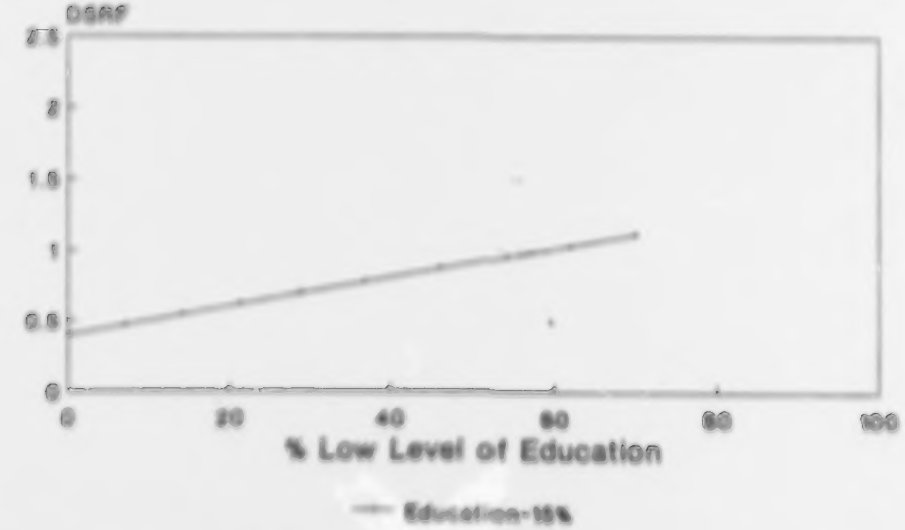
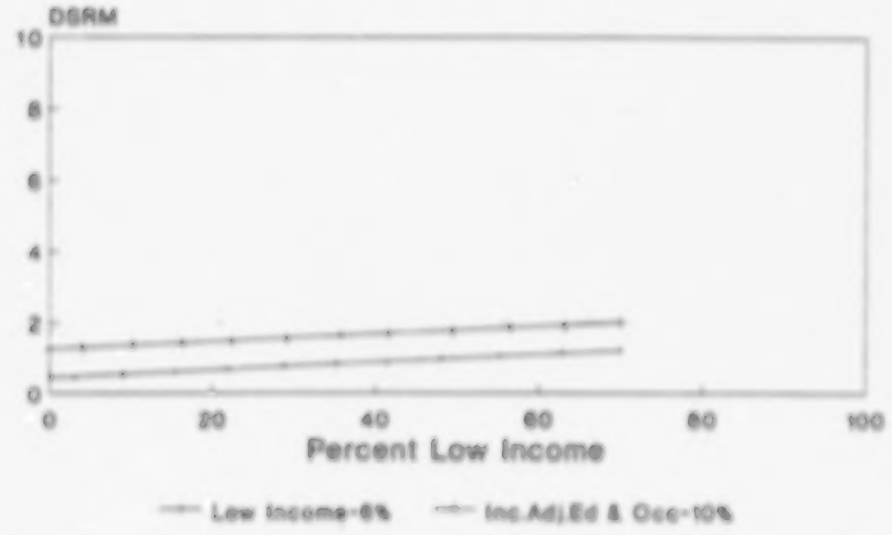


FIGURE 3-15

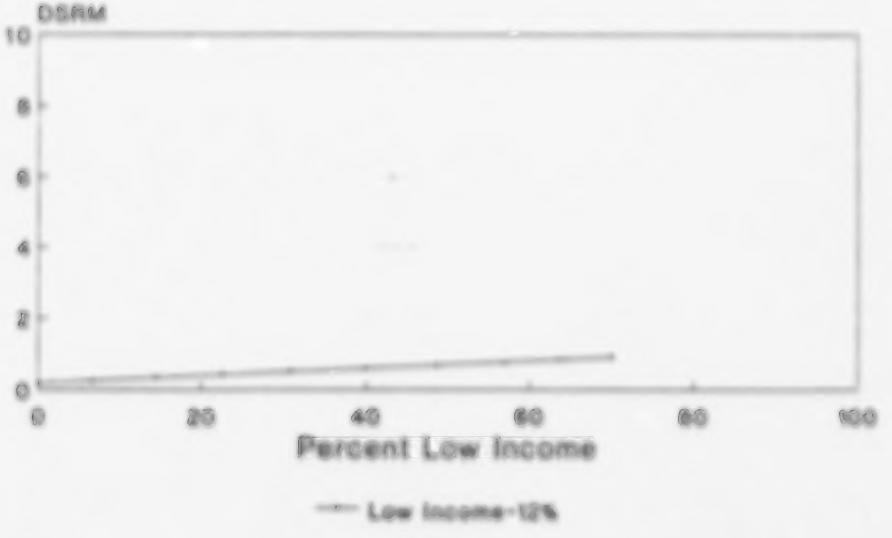
RESPIRATORY DISEASE-MALES
BY LOW INCOME
ADJUSTED AND NON-ADJUSTED



H197

FIGURE 3-16

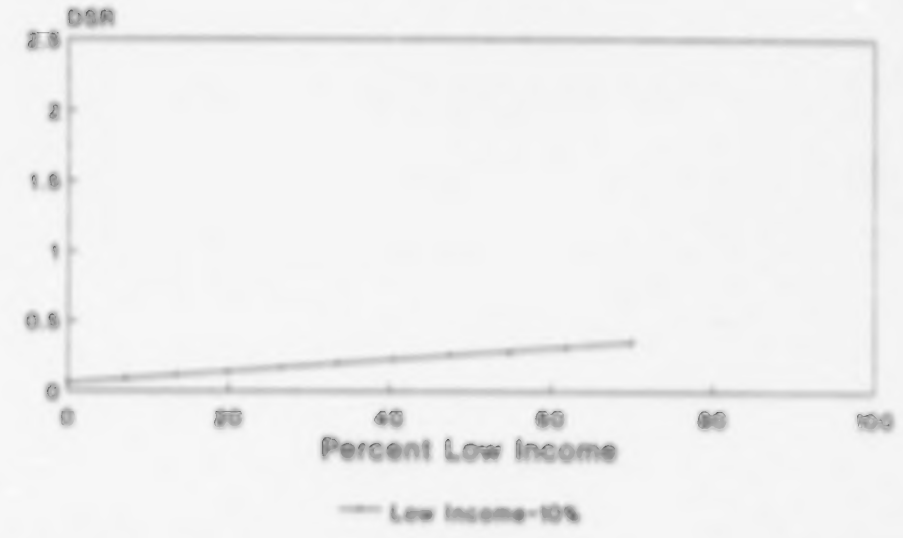
DISEASES OF THE DIGESTIVE SYSTEM-MALES
BY LOW INCOME



H204

FIGURE 3-17

CHRONIC LIVER DISEASE
AND CIRRHOSIS OF LIVER-BOTH SEXES
BY LOW INCOME



* For both sexes combined, mortality due to chronic liver disease and cirrhosis of the liver was associated with low income (Fig. 3-17).

(Because there were relatively few deaths from this cause, both sexes were combined for the analysis. These results should be interpreted very cautiously because the numbers are still small, but the slope increases almost four-fold.)

* Death from accidents and injuries was associated with low income for men and for women (Fig. 3-18 a & b). The association was stronger for men; and for women, it is only when we adjust for immigration status that the model meets our criteria.

(This is the only model to include the immigration status variable. It indicates the percent of recent immigrants in an area. The two lines appear to be superimposed on one another although the line that adjusts for immigration status is imperceptibly higher. The principal effect of including

immigration status in the model is to reduce the variability in the data.)

In practical terms, this means that poor areas with a relatively high percent of recent immigrants may have higher mortality rates for women from accidents and injuries.

• When deaths from motor vehicle accidents are excluded, the mortality rate for men from accidents and injuries was strongly associated with low income (Fig. 3-19). Living in an "ethnic" area appeared to have a slight protective effect.

• Suicide was associated with low income when the mortality rate was calculated for both sexes combined (Fig. 3-20). The association between poverty and suicide was strengthened when the level of education in an area is taken into account. Suicide rates were highest in poor areas with very low levels of education.

(Because there were relatively few suicides, statistically-speaking, see Table 3-1, it was not possible to calculate mortality rates for males and females separately. The slope for low income adjusted for level of education is both higher and steeper than the slope for low income unadjusted.)

Figures 3-11 through 3-20 deal with the mortality indices for which we found good models: these are the outcomes for which we were able to predict the mortality rate of a given census tract with some measure of certainty, given its socioeconomic and/or ethnocultural composition. All of these indices had a relative mortality ratio higher than 1.0 (Table 3-2), but the reverse is not necessarily true. That is, we were unable to find a good, predictive model for some of the indices with a relative mortality greater than 1.0. We explore the reasons for this apparent anomaly in the next section.

3.4 Discussion

The finding that mortality rates for certain major causes of death are associated with poverty will come as no surprise to most readers, considering the results of the recent report by Wilkins et al., and the studies they cite.
A total of 61 outcome variables was initially selected for analysis (Table 3-1). When we compared the median mortality rate for the poorest areas of the City with the median rate for the most affluent areas we found that poverty was associated with 50 of the 54 outcomes for which we had sufficient data (Table 3-2).

FIGURE 3-18a

ACCIDENTS AND INJURIES-MALES

BY LOW INCOME

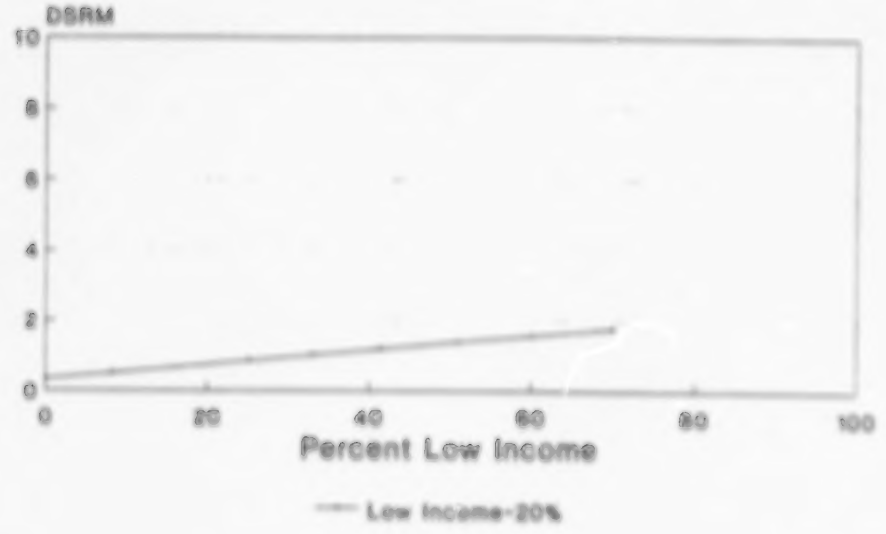


FIGURE 3-18b

ACCIDENTS AND INJURIES-FEMALES

BY LOW INCOME

ADJUSTED AND NON-ADJUSTED

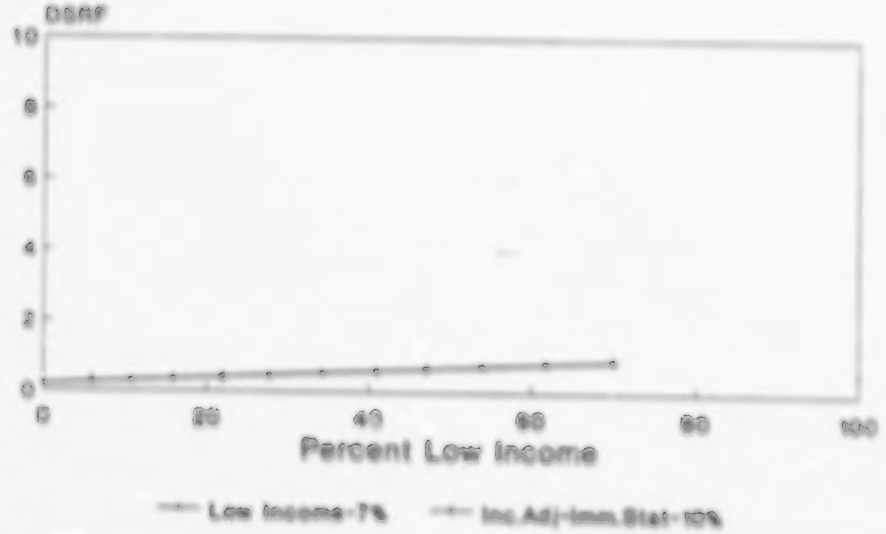


FIGURE 3-19

ACCIDENTS AND INJURIES-MALES

EXCLUDING MOTOR VEHICLE ACCIDENTS
BY LOW INCOME--ADJUSTED AND NON-ADJUSTED

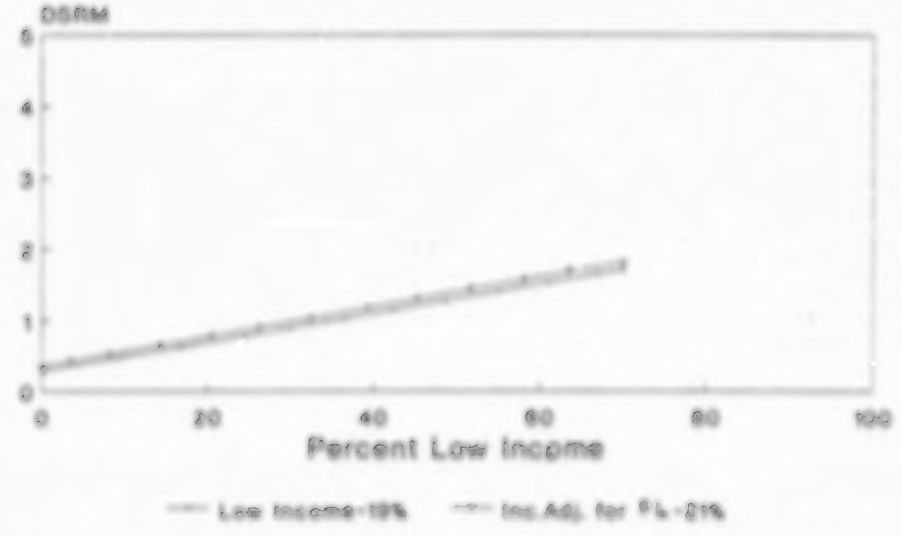
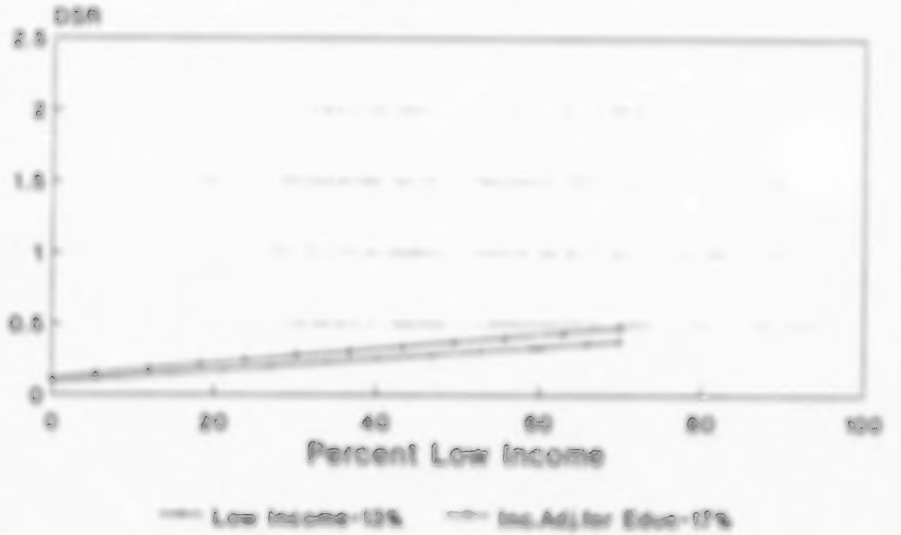


FIGURE 3-20

SUICIDE -- BOTH SEXES

BY LOW INCOME
ADJUSTED AND NON-ADJUSTED



Regression analysis substantiated these findings for 23 of the outcomes (Appendix B), including death from all causes, and revealed the relationship between education and three of the outcomes. For some of the outcome variables, regression analysis revealed that other socioeconomic and ethnocultural variables may ameliorate the effects of poverty, or to put it another way, in the absence of these conditions the effects of poverty may be worse.

The discrepant findings in the two types of analysis (i.e., 54 versus 23 outcomes) point to an important issue in the study of the relationship between income and health. On the one hand is the view that basic poverty is the risk condition, and considerable effort is devoted to conceptualizing and measuring what it means to be poor. While there are degrees of poverty, to be sure, from a measurement point of view we are talking about a discrete variable: an individual or a neighbourhood is poor, or it is not. On the other hand, recent research has tended to treat income in its association with health as a continuous variable and to focus on the development of indices of relative poverty, also called relative deprivation (Smith et al., 1990; Liberatos, 1988). The hypothesis here is that small additional increments of income result in small additional increments of health.

While we must be very cautious about drawing conclusions from ecological data, our findings suggest that poverty is indeed a risk condition for most of the major causes of death. Regression analysis, because it assumes a linear relationship between percent low income and mortality rates, is consistent with the notion of relative deprivation. The results of the regression analysis suggest that some causes of death may be associated with relative deprivation as well as with basic poverty.

Again, we caution against over-interpretation on this point. A more conservative approach to explaining why the regression analysis found fewer associations than the simpler comparison of income quintiles is that in methodological terms, regression is a more rigorous approach. Whether or not small increments of additional income would result in small additional increments of longevity, insofar as lung cancer, circulatory diseases etc. are concerned, we can be fairly certain that reducing poverty would reduce mortality rates from these diseases.

The regression analysis suggests that poverty was associated with mortality from lung cancer and accidents and injuries in both men and women. For both sexes combined, poverty was associated with death from chronic liver conditions and suicide.

Among men, poverty was associated with mortality from diseases of the circulatory, respiratory and digestive systems and to accidents and injuries.

For women, the regression analysis suggests that the relationship between poverty and death from lung cancer and accidents and injuries may be influenced by other socioeconomic and ethnocultural conditions. For men, these conditions may influence the relationship between poverty and death due to circulatory and respiratory conditions.

While the regression analysis found no significant association between poverty and mortality from circulatory disease in women, it did reveal a fairly strong association with other socioeconomic and ethnocultural conditions.

From a research point of view, these tentative findings about the role of other socioeconomic and ethnocultural variables are important, especially for understanding the risk conditions that affect women.

These results should be considered tentative at best because of the nature of the available measures. The proportion of people with a non-English or French first language in an area may be a contextual variable, provided it indicates that the area includes one or more specific ethnocultural groups that are large enough for acculturation to occur. But in Toronto, despite the tendency of most ethnocultural groups to cluster, a high proportion of people with a non-English/French first language in an area could just as easily indicate the presence of several smaller groups, in which case we cannot be certain whether we are measuring the effect of culture at all. We may simply be measuring at the ecological level the association between country of birth and mortality that was reported in the last chapter, with all the ambiguities that involves.

In either case, it is not clear whether we are measuring the effect of specific cultural practices or the social support that an individual may enjoy by virtue of their membership in a relatively cohesive ethnocultural group, or something quite different. In neither case are we measuring the effect of linguistic barriers, since the first language variable, whatever it is measuring, plays a consistently beneficial role in the models described above.

Another complication is the presence in some poor areas of Toronto of large numbers of people who identified themselves as Black in the census and/or who were born in the Caribbean. Most have English as their first language. The finding that poor areas with a high proportion of residents with one of the official languages as their first language have the highest mortality

rates could easily be pointing to these areas. Paradoxically, our findings about first language may mask the presence of racial differences in health status.

In summary, then, the finding that ethnicity (as measured by first language) may ameliorate the effects of poverty raises more questions than it answers. If the purpose of exploratory research is to generate fruitful hypotheses, and we believe it is, there is a substantial research agenda here that will require new measures and different data.

The role of education and occupation is even more problematic. These were the weakest measures; it is arguable whether they are contextual variables, and their ecological correlations with income and first language are high. Nonetheless we report the results for these variables because they appear to reduce the variability of the data and improve the predictive ability of the models in a few cases.

For circulatory disease in women, level of education appears to be the most important factor. The lower the level of education in an area, the higher the mortality rate for circulatory diseases. When we adjust for first language, this model predicts 20 percent of the variance in the data. By the standards of social science, this is a respectable result.

The question is whether we are really measuring the association between mortality and level of education or whether the latter is a proxy for something else. Is level of education a contextual variable; that is, can we reasonably speak of areas with low levels of education in the same way we speak of poor areas? And more to the point, does living in the midst of people who are poorly educated have any effect on a person's health? These questions are particularly relevant when we are talking about so-called lifestyle diseases.

We would not have found a model for respiratory disease in males that met our criteria unless we had adjusted for education and occupation. And finally, the role of occupational status is highly significant in the models for death from all causes; it was discussed in detail in the last section.

These disparate results for education and occupation suggest only that they ought to be taken into account whenever possible in future research because they can obscure the relationship between poverty and health. Education and occupational status are obviously important in their own right, with regard to health status, but our findings are too tentative to support any conclusions in this vein.

3.5 Conclusion

Using only the measures that are readily available, we have been able to explain 30 percent of the difference in mortality rates of census tracts for deaths from all causes for males and females combined. If we were able to take into account the physical environment of a census tract and had better indicators of its social environment, we could probably do even better. And if we focused in detail on a particular set of census tracts and investigated the conditions associated with health status in individuals, we could learn even more about health inequalities.

Nonetheless, by the standards of social science, 30 percent of variance explained is a respectable result. We can say that we understand a good deal about the overall mortality experience of the City of Toronto with this result. When it comes to specific causes of death, however, we know a great deal less. We can explain about 20 percent of the variation in mortality rates of census tracts for circulatory diseases, and less than 15 percent for heart attacks.

In part, this is because there may be too few deaths (in statistical terms) from specific causes for any pattern to be revealed. One remedy for this problem is to work with larger data sets. Equally important, however, is the fact that the etiology for specific diseases is bound to vary and the role of socioeconomic risk conditions is therefore more difficult to pinpoint. Poverty may be associated with the onset, the course or the outcome of a chronic condition, or all three. Mortality rates, especially at the ecological level, are indirect measures, at best.

What is required now is a focus on the major causes of death for which we have found some indication that socioeconomic (especially poverty) and ethnocultural conditions are involved. In the next chapter we address the question of whether that focus should be on behavioural risk factors or more directly on the risk conditions themselves.

CHAPTER FOUR

SURVEY RESEARCH ON RISK FACTORS AND RISK CONDITIONS

4.0 SURVEY RESEARCH ON RISK FACTORS AND RISK CONDITIONS

4.1 Introduction

The studies described in the two previous chapters found evidence of an association between socioeconomic status, ethnocultural background and health status. But studies such as these inevitably raise questions about the role of psychosocial and behavioural risk factors. Survey data would seem to offer a unique opportunity to investigate the associations between risk factors, risk conditions and health status in individuals. Although we cannot make causal inferences on the basis of measurements taken at one point in time, survey data can be very useful for assessing the validity of theoretical frameworks or models such as the one described in chapter one.

In this chapter we present the results of a study of the association between several risk factors and risk conditions and selected health outcomes using data obtained in two community health surveys undertaken by the City of Toronto Department of Public Health in 1983 and 1988.

Even though these surveys under-represented the disadvantaged segments of the City's population, especially in 1988, they contain a great deal of information about respondents' risk factors and risk conditions. The study was undertaken in part to assess the theoretical framework that we have called the socioenvironmental approach to health, and partly to assess the real usefulness of community health survey data for addressing the issue of health inequalities.

Epidemiologists use the term social position to describe a person's place in society: that place is defined in large part by their age, sex, ethnocultural background and socioeconomic status. Although age, sex, and race are clearly biological characteristics, they have social significance that may shape the health status of individuals. For example, as dimensions of social differentiation, they have implications for access to social and material resources which may, in turn, have consequences for health. Hence, these variables, along with socioeconomic status, may be conceptualized as dimensions of social differentiation that are associated with particular patterns of life chances (MacIntyre, 1986).

Inequalities in health status and their association with these various dimensions of social position have been amply documented in other Canadian surveys of health status. We turn first to a brief review of this literature.

4.1.1 Canadian Survey Research on Inequalities in Health Status

Age, like sex, is a ubiquitous social variable for which data are always collected in health surveys. There appears to be a steady gradient in the association between age and self-reported health problems and long-term activity limitation (Statistics Canada, 1981; 1987).

In relation to mental health, a Saskatchewan survey of the prevalence of nonpsychotic psychiatric symptoms (D'Arcy, 1982) determined that women showed a general decline in mean symptom scores with age (with the possible exception of those over 70 years), whereas men exhibited a U-shaped distribution of scores. For men, both younger and older age groups experienced high levels of symptomatology.

These findings may reflect cohort effects, as well as aging, and the social aspects of aging may also have effects on health (MacIntyre, 1986). These issues need to be considered when the associations between age and health outcomes are interpreted, especially if they are derived from cross-sectional data. Prospective studies are required to determine the relative importance of these effects.

Health differences between women and men may be summed up as follows: women live longer than men, but have higher rates of illness. With respect to morbidity, women tend to report higher rates of acute conditions, short-term disability, physician visits, and prescription and non-prescription drug use. A higher prevalence of anemia, thyroid disorders, headache, arthritis, rheumatism, and mental disorders in women (LaPierre, 1984) may lead to disability, symptoms, and medical care, but these conditions do not lead to death. In contrast, higher rates of life-threatening chronic diseases in men, such as heart disease, arteriosclerosis, and emphysema may help to explain their higher mortality rates (Verbrugge, 1989).

Mental health data also suggest sex differences. Female respondents in the 1978-79 Canada Health Survey reported feeling less happy than men, whether they were working outside or inside the home (LaPierre, 1984). Women experience more anxiety and depressive disorders, but lower rates of schizophrenia, alcohol and drug dependency, and personality disorders and anti-social behaviour (D'Arcy, 1988).

A number of explanations have been proposed to account for the distinct health experiences of men and women:

1) **biological risks** - intrinsic differences based on genes or hormones;

2) **acquired risks** - differences in work and leisure activities, lifestyle and health habits, psychological distress, and other aspects of an individual's social milieu;

3) **psychosocial aspects of symptoms and care** - differences in the way men and women perceive symptoms, assess their severity, and decide upon health actions which are available to them;

4) **health reporting behaviour** - differences in how symptoms are discussed with others (including interviewers); and

5) **prior health care and ca. kers** - how one's actions or those of a health professional influence the course of a disease or future onset of others (Verbrugge, 1989). Most studies of sex differences in health status are now designed to test the validity of these various explanations.

There are few Canadian data concerning ethnicity and health (D'Arcy, 1988). At the national survey level, as we indicated in chapter two, this reflects an apparent lack of consistency in the past in the measurement of ethnocultural differences in health status.

In contrast to the dearth of Canadian data on the health status of other ethnocultural groups, a relatively large literature on Native health has been amassed. The vast majority of the studies focus on reserve, as opposed to, urban, populations. They demonstrate clearly that Indians and Inuit have poorer health than non-Natives. Natives who migrate to the city are thought to have many of the same problems as those on reserves (Shah & Farkas, 1985; Taylor, 1988). These include a high prevalence of anemia, diabetes, gallbladder disease, infectious and parasitic diseases, lung disease, hearing impairment, visual defects, and dental problems (Shah & Farkas, 1985). Information concerning mental health, although scant, suggests an increased prevalence of solvent sniffing, suicide, crime, depression, anxiety, and family crises amongst urban Natives (Shah & Farkas, 1985).

Although these problems may be strongly related to low socioeconomic status (Shah & Farkas, 1985), a British investigator has cautioned against "lumping" ethnic groups into the large and heterogenous category of "the disadvantaged" (Whitehead, 1987). This point is illustrated by persistent ethnic variations in adult and perinatal mortality when socioeconomic status has been controlled, suggesting that health differences related to cultural background may not be artefacts of social class (Marmot et al., 1984; Gillies et al., 1984).

Socioeconomic status is usually operationalized with three variables: income, occupation, and education (see Sections 1.2.1 and 3.2.2). When health status data are examined in relation to

socioeconomic status, clear patterns emerge -- "the poorer you are, the less healthy you are likely to be, over a shorter lifetime" (Wilkins, 1988, p. 24).

The Canada Health Survey (Statistics Canada, 1981) found that mental disorders, heart disease, bronchitis and emphysema, sight disorders, diabetes, arthritis and rheumatism, hypertension, and hearing impairments were more prevalent in the lowest income group than in all others. It was noted that these problems are more limiting than the trauma, hay-fever, and skin disorders that were reported more frequently by those in the highest income group. Short-term and long-term disability tend also to be more prevalent among those with low income and education (Statistics Canada, 1981).

Inequalities in mental health have also been documented. In the Canada Health Survey (Statistics Canada, 1981), psychological well-being was inversely related to income, and the frequency of symptoms of anxiety and depression increased as income decreased. People with lower socioeconomic status also perceive themselves to be less healthy (Wilkins, 1988).

Finally, health behaviour also appears to differ by socioeconomic status. Using data from the 1978-79 Canada Health Survey, the 1981 Canada Fitness Survey, and the labour force smoking surveys of 1975 and 1983, analysts found that the prevalence of risk factors for coronary heart disease increased for both men and women as educational attainment decreased (Millar & Wigle, 1986).

In summary, Canadian survey research suggests that health status differs according to social position defined by age, sex and socioeconomic status. Although Canadian data concerning ethnocultural differences are scant, the evidence of persistent health disadvantages of Natives as well as British work in the field suggests there may be ethnocultural differences in health status, as well.

The model that we use to examine the health status of Toronto residents who responded to one or the other of the two health surveys attempts to consider, simultaneously, these dimensions of social position.

4.2 Data and Methods

4.2.1 Data

The sample for the two surveys consisted of City of Toronto residents who were contacted through modified versions of random digit dialing and who agreed to participate in telephone interviews. The data and methods of these two surveys were

described in detail in two earlier reports (City of Toronto 1984a, 1990a).

In the 1983 Toronto Community Health Survey (TCHS 1983), one randomly selected individual 15 years of age and older from each of 981 households (of 1,226 contacted) completed an interview, resulting in a response rate of 80 percent. In the 1988 survey (TCHS 1988), 1,920 eligible households were contacted and one person from each of 980 of these units agreed to participate. This represents a response rate of 51 percent.

The validity of survey data depends on the degree to which the individuals interviewed are representative of the City of Toronto's population. As such, it reflects the generalizability of the survey findings. In comparison with census data for the City, the 1983 survey under-represented the following groups: (1) males, especially those aged 25-20, 65-69 and 75+; (2) non-English speaking first language, especially Portuguese, Italian and Polish groups; and (3) the lowest income level. Divorced individuals and those with household incomes of $30,000 or more were over-represented.

Similarly, the 1988 survey over-represented (1) those who speak English in the home; (2) those with incomes over $50,000; (3) high school and university graduates; and (4) men and women between the ages of 20 and 54 years.

Finally, people without working telephones and those not living in private households were not covered by the sampling methods of either survey. Although these individuals may represent only a small proportion of the City's population, the theoretical framework that we described in chapter one suggests that they are more likely to be health-disadvantaged.

4.2.2 A Conceptual Model

The decision about which variables from the two surveys to use and how to use them was governed ultimately by the theoretical framework outlined in chapter one. This framework is too abstract to provide the kind of practical guidance needed for research, so we adapted a more concrete model from work published by investigators with the Alameda County study. This was a prospective study of mortality risks in a random sample of the population in Alameda County, California (Haan et al., 1987).

Although their work focused on mortality, we believe the Alameda group's conceptualization of relevant risk factors and conditions is relevant to morbidity because it is consistent with evidence from other published work in the field. It also conceptualized

TABLE 4 - 1

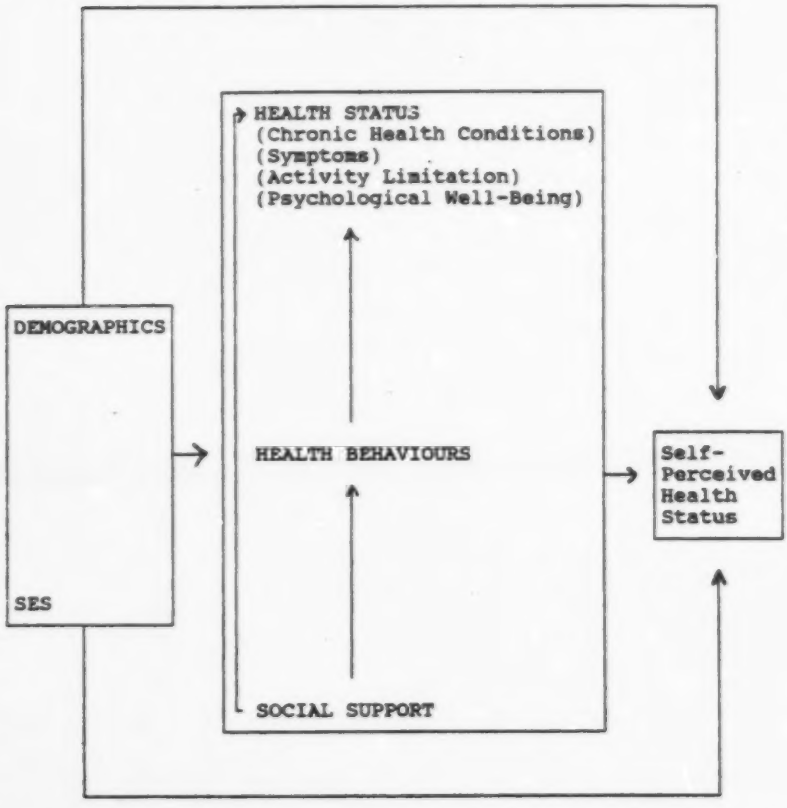
MEASUREMENT OF TCHS VARIABLES

VARIABLES	*MEASUREMENT*
DEMOGRAPHIC	
Sex	
Age	
Race	Visible Minority; Other
Ethnicity	
First Language/Language Spoken in home	English/French; Other
Country of Birth	Canada; Other
SOCIOECONOMIC STATUS VARIABLES	
Income	<$10,000;10-20,000;20-30,000;30-50,000;50,00+
Education	See Section 4.2.3
Occupation	(1)Professional;(2) Semi-prof/ technician; (3)Foreman/ supervisor; (4)semi-skilled craft/clerk; (5)sk craft/ clerk/farmworker; (6) unskilled
Housing Tenure	Rent/Own Home
HEALTH STATUS	
(Chronic Conditions)*	Present/Absent
(Symptoms)	Present/Absent
(Activity Limitation)	None/Some/Major
(Self-perceived Health)	Excellent/Good/Fair/Poor
(Brief Psychological Well-Being Scale)	1-12 (Low-High)
(General Level Happiness)	Very happy/Pretty happy/Not too happy
HEALTH BEHAVIOURS	
Smoking	Never/Former/Current
Drinking	0-3;4-13;14+ drinks/week
Physical Activity	Sedentary/Somewhat active/ Moderately active/Active
SOCIAL SUPPORT	
Marital Status	Married/Sep/Div/Widow/Single
Berkman Social Network Index	Low/Medium/Medium-High/High
OTHER	
Job Exposure to Health Risk	Yes/No

* Variables in parentheses may be used as both predictor and outcome variables, depending on the particular regression model.

FIGURE 4-1

CONCEPTUAL MODEL OF HYPOTHESIZED ASSOCIATIONS
BETWEEN SELF-PERCEIVED HEALTH AND PREDICTOR VARIABLES



very nicely the relationships among the variables in Figure 1-1 for which we had TCHS data.

Table 4-1 lists and describes the coding of these variables and **Figure 4-1** illustrates schematically the main components of the conceptual model for one of the selected health outcomes, self-perceived health status.

We use the language of causality in this section to describe the hypothesized nature of the associations among the variables in Figure 4-1. But the reader must realize that while these hypotheses guide the analysis that follows, we cannot draw any conclusions about cause and effect from the data. We use the terms "outcomes" and "predictors" because they are a convenient shorthand way to describe the two basic sets of variables: those

that describe health status and those that describe the factors and conditions that we believe to be associated with health status.

Age, sex, and ethnocultural background are listed as demographic variables in Table 4-1. Housing tenure is included along with income, education and occupational status as measures of socioeconomic status. These variables are hypothesized as influencing self-perceived health status both directly and indirectly.

Health behaviour and social support may also directly influence self-perceived health status, and may vary according to age, sex, socioeconomic status, and ethnocultural background (Berkman & Breslow, 1983; MacIntyre, 1986). We use the term social support to refer to the number of social ties an individual has and the frequency of their social contacts (House, Umberson and Landis, 1988). This variable indicates the structural element of social relationships but does not include a measure of their quality.

As indicated in Table 4-1, some of the health outcome measures are used as both predictor and outcome variables for reasons that will become evident below.

Although some relationships may be reciprocal in nature (e.g., social support may affect a person's psychological state, and psychological problems may affect their ability to interact with others), only one pathway is shown in Figure 4-1. Demographic and socioeconomic variables are conceptualized as though they influence health status both directly and indirectly, through their influence on social support and health behaviours. The latter variables were considered to have a direct influence on health outcomes.

Finally, depending on the nature of the health outcome under investigation, certain health outcomes may influence others. For example, if self-perceived health status or psychological well-being is being considered as a health outcome, the presence of chronic conditions, symptoms and/or activity limitation may affect an individual's response to these items. Similarly, if activity limitation or symptomatology are evaluated as outcome variables, the presence of chronic conditions may affect their measurement. We assumed that the other indicators of health status would not influence the presence of chronic health conditions.

4.2.3 Measures

Measurement of the various components of the model was, of course, constrained by the questions that were asked in the two surveys. Moreover, because the questions asked in the surveys

were not identical, measurement of some of the concepts is not strictly comparable between TCHS 1983 and TCHS 1988.

The ethnocultural variables raised the most concern. Both surveys asked questions about country of birth, year of immigration, and race. Information about language(s) spoken was also collected but TCHS 1983 recorded first language whereas TCHS 1988 asked about the language currently spoken in the home.

Country of birth, race, and the measures of language were chosen for analysis; but the relatively small number of respondents from many of the different ethnocultural groups made it necessary to dichotomize these measures as indicated in Table 4-1. The use of these relatively crude indicators seriously limited our assessment of ethnocultural differences in health status.

Socioeconomic status was measured by income, occupation and education. The household income data that typically collected in surveys do not reflect differences in household size. We attempted to adjust income data for TCHS 1983 and TCHS 1988 by creating a dichotomous low income variable that took account of household size (for a similar approach, see Chambers and Reynolds, 1990). However, the bivariate associations between this variable and the health status outcomes were essentially the same as for the five-category income variable taken directly from the questionnaire. We opted to use the five-level variable.

Occupation was measured by a series of questions that enabled us to categorize jobs according to their status: the six-level scale categorizes occupations according to the amount of discretion they permit the occupant of the position (City of Toronto, 1984a, p. 11). The 1983 survey recorded occupation of both head of household and respondent, whereas the 1988 survey measured only the respondent's occupation. Since it is the occupation of the head of the household that confers status on the household as a whole (head of household is by definition the person whose job has the highest occupational status), it was the variable of choice for TCHS 1983. In the TCHS 1988 sample, a work-related variable, exposure to risks such as accident, injury, or noxious substances, was also examined for its effects on health status outcomes.

Education was measured in slightly different ways in the two surveys. In TCHS 1983, the following categories were used: (1) some secondary education or less, (2) secondary diploma, (3) some post secondary, (4) post secondary certificate or diploma, (5) bachelor's degree or equivalent, and (6) one or more graduate degrees. In TCHS 1988, the following categories were recorded: (1) no schooling, (2) grade school, (3) some highschool, (4) completed highschool, (5) commercial/technical/community college,

(6) some university, (7) completed university, and (8) post graduate university/ professional school.

Finally, housing tenure was used as another measure of socioeconomic status in the TCHS 1988 analysis. It distinguished individuals who owned their accommodation, from those who rented.

Three types of health behaviour were measured: alcohol consumption, cigarette smoking and physical activity. Questions concerning drinking behaviour were slightly different for the two surveys, but responses were standardized as shown in Table 4-1. Smoking status was categorized as current, former, and never. The measurement of physical activity was based on a series of questions comprising an index constructed by the U.S. Centres for Disease Control for their behavioural risk factor surveys (City of Toronto, 1984a, p. 11).

For the 1983 survey, the only measure of social support was marital status, whereas all the components necessary to construct the Berkman Social Network Index (BSNI) were included in the 1988 survey. The BSNI comprises the number and frequency of contacts with friends and relatives, church membership and group membership. It gives greater weight to intimate contacts (family and friends) compared to church and group membership because the former relationships have been found to have stronger associations with mortality risk (Berkman & Syme, 1979).

As Figure 4-1 indicates, five measures of health status were available from each of the two surveys: three measures of physical health status (chronic health conditions, symptoms and activity limitation); a measure of psychological well-being; and self-perceived health status.

Self-perceived health status was measured with a single question on how respondents feel about their overall health status and was the first question asked in both surveys. It serves as a good "ice-breaker" for health surveys, but it probably measures several dimensions of health (City of Toronto, 1989b, p. 20).

The 1983 measure of psychological status is the five-item Brief Psychological Well-Being (BPWB) scale, an abbreviated version of the General Well-Being scale that was developed in consultation with the originator of the latter, widely-used instrument. (City of Toronto, 1984a, p. 10). Higher scores on the BPWB are supposed to indicate higher levels of psychological well-being. No work has yet been done to validate this scale and it was not included in the 1988 survey, necessitating the use of a single question on respondents' general level of happiness for TCHS 1988.

Activity limitation and the presence of chronic conditions and symptoms were used as indicators of physical health status. Limitation in activity was determined from a series of questions concerning limitation in major activity (work, keeping house, going to school) and in routine physical activities (walking, using stairs, standing or sitting for long periods, etc.). The activity limitation outcome variable is probably the most valid of all the outcome measures that were available in TCHS 1983 and 1988: it has been used widely and is quite straight forward in terms of what it purports to measure.

Several questions about the presence or absence of specific health problems were included in both surveys. We used this information to construct two outcome variables, one for medically diagnosed chronic conditions, and one for self-reported symptoms. In 1983, respondents were simply asked whether or not they had any of the specified health problems, so we were forced to make inferences about whether or not they had been medically diagnosed. In 1988, respondents were explicitly asked whether the problem had been medically diagnosed, and they were asked about a wider range of problems.

For the 1983 survey, chronic conditions included heart trouble, diabetes, emphysema or chronic bronchitis, and a history of cancer. We assumed that if respondents were reporting these conditions they would have been diagnosed by a physician. The 1988 survey asked about anemia, arthritis, rheumatism, asthma, migraine headaches, serious back trouble, mental health problems such as chronic depression or anxiety, stomach ulcer or other digestive problems, as well as the conditions asked about in 1983.

For the 1983 survey, the following health problems were considered to be symptoms, that is, physical states of a self-reported nature: asthma, persistent cough or shortness of breath, migraines, and back trouble. While they may have been diagnosed by a physician, there was no way to be certain that was the case. For the 1988 survey, symptoms were measured by responses to questions that asked about the presence of skin rashes or itching or burning skin; coughing or shortness of breath; itching or burning eyes, nose, or throat; and headaches other than migraines.

4.2.4 Sample Characteristics

The issue of the representativeness of the two surveys has been dealt with at length in the initial reports that were prepared for each (City of Toronto 1984a and 1990a) and in section 4.2.1

above. In this section, we compare the distribution of responses on the above variables for the two samples. These data are presented in detail in Appendix C.

In terms of the demographic characteristics of the two samples, the sexes are equally represented in the TCHS 1988 survey compared to TCHS 1983 where more females responded. For both surveys, those aged 20-24 and 30-34 years comprised the two largest single age groups sampled. Just under 50 percent of both samples were not born in Canada. This was reflected in approximately one-third of the TCHS 1983 reporting a first language other than English or French. In contrast, 86 percent of the TCHS 1988 sample indicated that English was the main language spoken in the home.

Among the socioeconomic status variables, a tendency toward higher reported household incomes appeared in the TCHS 1988 sample. In 1983, the $10-20,000 category contained the highest percentage of respondents (26 percent), whereas in 1988, those earning $50,000+ comprised the single largest category (33 percent). The 1988 sample also has larger proportions of respondents in higher education categories. In 1983, the largest single education category was secondary school or less, with 33 percent of the respondents. In 1988, the equivalent category represented only 19 percent of the respondents, with those who completed university comprising the largest single education category (22 percent).

Occupational status groups were similarly distributed between the two surveys. Except for a tendency for the foreman/supervisor category to be small in both surveys, and for the semi-professional/technician category to be relatively large in the TCHS 1988 sample (30 percent), the distributions of the remaining occupational categories were generally similar, ranging from 15 to 20 percent. A final measure of socioeconomic status, available only for the 1988 data, was housing tenure. Almost three-fifths of those surveyed indicated that they rented their dwelling.

Health behaviours were measured by smoking, drinking, and physical activity. In both samples, approximately one-third of respondents were current smokers, one-quarter were former smokers, and two-fifths had never smoked. Drinking behaviour varied more widely between the two survey groups. In 1988, 75 percent of the sample reported drinking 0-3 alcoholic beverages per week, compared to 56 percent in 1983. Only four percent of the 1988 respondents consumed 14 or more drinks weekly, compared to 14 percent in 1983. Interestingly enough, although 1988 respondents reported drinking less, they also tended to be less physically active than the 1983 sample. Only 25 percent were active, and 14 percent were sedentary, compared to 49 percent and seven percent for the 1983 respondents.

The social support measures indicated equal numbers of married and single respondents (roughly 40 percent for each category). In the TCHS 1988, 45 percent of respondents scored "medium" for the Berkman Social Network Index. While 21 percent and 18 percent scored "medium-high" and "high," respectively, a sizeable proportion (16 percent) reported low levels of social support.

Comparisons of health status outcomes between the two surveys is more difficult because of the differences in measurement. For example, chronic health conditions were more common in the TCHS 1988 sample (38 percent reported having at least one condition, compared to only 12 percent in 1983), but this obviously reflects the inclusion of more conditions in the 1988 survey. Differences are also apparent for those reporting symptoms in the two surveys (38 percent in 1988 compared to 28 percent in 1983). Here, again, the items comprising the variable were not the same for the two surveys.

Activity limitation was consistently measured for both data sets. Approximately three-quarters of all respondents in both samples reported no limitation in their activities, while ten percent reported limitation in their major activity. Self-perceived health status was also determined in the same manner for both surveys. Over 80 percent of both samples reported excellent or good health, although 39 percent of the TCHS 1988 said their health was excellent, compared to 30 percent in 1983.

Finally, individuals generally reported favourable psychological states, at least, as measured by the Brief Psychological Well-Being Scale (BPWB) in TCHS 1983 and the general level of happiness in TCHS 1988. Over 50 percent of the 1983 respondents had high BPWB scores, while only seven percent scored at the lowest end of the scale. Similarly, 90 percent of the 1988 sample reported to be generally very happy or pretty happy.

4.2.5 Methods

The basic method of analysis was to look first at bivariate associations among the variables specified in the conceptual model and then to create multivariate models for each of the health outcomes for the two surveys, using a variety of regression techniques. The regression model for each outcome was determined by the conceptual model. In these models, variables are considered either to be outcomes or predictors.

Prior to conducting the regression analysis, the data from both surveys were checked for problems of collinearity (Kleinbaum, Kupper and Muller, 1988). Bivariate correlation matrices indicated that the predictor variables were not highly correlated

with one another. Hence, all of the predictor variables included in the conceptual model described above were included in the regression models (except, of course, when they were available only in one of the surveys).

The model that was created for the activity limitation outcome, for example, included all of the demographic, socioeconomic, health behaviour and social support measures, as well as the chronic conditions variable. The bivariate analysis indicated that there were associations between activity limitation and all of the "predictor" variables in the model; the purpose of the regression analysis was to see how many of these associations would persist when all of the other predictors were held constant in the analysis.

Tests of statistical significance were performed in each case, primarily because the sheer number of associations required some way of summarizing them. We would emphasize that tests for statistical significance make assumptions about the validity of data that are very difficult to meet, especially for the multivariate techniques. In the results of the bivariate analysis that follow, we attempt to examine overall trends in the data, regardless of their statistical significance. For the multivariate analysis, however, we report only the results that were statistically significant at the .05 level.

We performed cross-tabulations, one-way analysis of variance (ANOVA), and multiple regression analyses. ANOVA was used to assess bivariate associations between the BPWB Scale and each predictor variable because its measurement was interval level. The Chi Square test for goodness of fit was used to assess bivariate associations between predictor variables and the other health status outcome variables.

Multiple regression analysis was performed to assess the direct effects of each predictor variable on health outcome measures, after adjusting for the effects of all of the other predictor variables. Three types of multivariate regressions were performed, ordinary least squares, logistic and loglinear. The choice of technique depended on the level of measurement of the outcome variable. For interval level data (i.e., the Brief Psychological Well-being scale), ordinary least squares regression was used. For variables with binary level outcomes (e.g., chronic conditions: yes or no), logistic regression was performed. Finally, for outcomes with more than two categorical levels, (e.g., activity limitation: none, some, major), loglinear analysis was used.

In each case, a "backward elimination" technique was used to remove predictor variables from the regression equation. The regression equation initially included all of the predictor

variables in the model and variables were removed one at a time if they failed to enhance the overall accuracy of the model's predictions (Kleinbaum, Kupper & Muller, 1988).

Respondents younger than 23 years of age were excluded from the multivariate analysis. We reasoned that adult roles and behaviours would likely be established by then, making the results easier to interpret.

4.3 Results

4.3.1 Bivariate Analysis

Analysis of survey data typically begins with simple cross-tabulations of the association between health status variables and each of the other variables of interest. Whether the researcher goes on to stratify or to model the relationships among these variables, bivariate analysis is a useful first step.

The detailed cross tabulations that were prepared for this analysis have not been reproduced in this report because of their length, but they are available on request from the Community Health Information Section. Much of their content is available in existing or forthcoming reports on the two surveys in any case (City of Toronto 1984a, 1990a). What follows is a brief summary of these bivariate associations: some of the results are very clear and others are more mixed.

Sex and age appeared to be associated with the physical health indicators, with women and respondents in older age categories reporting chronic health conditions, symptoms, and activity limitation more frequently than men and younger respondents. Conversely, no clear trends were found in the associations between psychological health measures and these two demographic indicators.

Associations between the measures of ethnicity and health status indicated that respondents who were born outside of Canada, whose language (spoken in the home or first language) was not English or French, and who were visible minorities were more likely to report poorer psychological health and to perceive their health as fair or poor. In the TCHS 1988 sample, they also appeared to report physical health problems more frequently than respondents who were white, Canadian born, or whose first language was English or French. However, this trend appeared to be reversed in the TCHS 1983 sample.

Socioeconomic status appeared to be associated with both the physical and psychological measures, as well as self-perceived

health. Chronic health conditions, symptoms, and activity limitation were generally reported less frequently as income and education increased. Similarly, respondents with higher income, education and occupational status had higher BPWB scores, and were more likely to report being very happy and to perceive their health as good or excellent than lower socioeconomic groups.

Health behaviours showed mixed trends in their association with health outcomes. Respondents who had never smoked generally tended to report better physical health status than former or current smokers. This trend also held for psychological health status in the TCHS 1988 sample; but in TCHS 1983, former smokers had better psychological health outcomes than either current smokers or respondents who had never smoked.

Relationships between drinking behaviour and health outcomes were equivocal. There may be some tendency for those respondents who consumed three or less alcoholic drinks weekly to report poorer physical health than moderate or even heavy drinkers; or to put it another way, respondents whose physical health was poor consumed less alcohol.

Increasing physical activity appeared to be related to better health outcomes, although this relationship was more clearly evident in TCHS 1988 than in TCHS 1983.

Decreased levels of social support and exposure to health risks on the job appeared to be associated with poorer physical and psychological health status.

Finally, physical health status and self-perceived health were associated with the other health outcome variables as might be expected: poor health status on one health outcome measure was always associated with poor outcomes on other measures.

Of the ten outcome measures (five in each of the two surveys) only one, the measure of symptoms in TCHS 1983, was not consistently associated with the predictors in the bivariate analysis. On the basis of these results, multivariate analysis was undertaken for the other nine outcome measures.

4.3.2 Multivariate Analysis

The results of the bivariate analysis immediately suggest the need to control for certain variables that might be influencing the observed associations. An obvious example is the association between health status and marital status, the only indicator of social support that was available in TCHS 1983. We found, for example, that widows tended to report chronic conditions more frequently than single respondents. However, widows tend to be

older than single people, and chronic health conditions tend to increase with age. Hence, age may account for the observed association between marital status and chronic health conditions.

Similarly, in the TCHS 1983 sample, psychological well-being increased as weekly alcohol consumption increased. BPWB scores were also higher for respondents with higher income, education, and occupation who, in turn, may use alcohol more frequently (Wilkins, 1988). Did these respondents score higher on the BPWB scale because of their drinking behaviour, or because of their higher socioeconomic status?

Bivariate analysis also showed that smoking behaviour was associated with income, education and occupation: respondents with lower socioeconomic status (SES) were more likely to be current smokers in both TCHS 1983 and TCHS 1988 (City of Toronto, forthcoming). Lower SES respondents also reported more health problems. Was that because they smoke, or do they suffer poorer health regardless of their smoking status. Does social support make a difference?

Multivariate analysis can help address questions such as these. By including all of these variables in our model, we are able to look at the association between any one of them and a given outcome variable while holding the effect of all the other predictor variables constant. We can see, for example, if there is an association between income and activity limitation regardless of whether a person is young or old, male or female, engages in risk behaviour or not, has lots of social support or none, and so on.

Our strategy was simple yet rigorous. We started with the hypothesis that each of the demographic, socioeconomic, social support and health behaviour variables would be associated with each health outcome, even when we controlled for all the other predictor variables. The first stage of the regression analysis was to test that hypothesis for each of the nine health outcomes for which we had found consistent results in the bivariate analysis (that is, for all but the TCHS 1983 symptoms measure). In no case were all of the parameters in the full model statistically significant.

We then revised the model for each outcome by simply eliminating the variable that contributed least to the model's accuracy, and continued to do that until we had a model in which all of the parameters were statistically significant.

Not surprisingly, the outcome variables for which we were able to fit good models were activity limitation (TCHS 1983 and TCHS 1988) and chronic conditions (TCHS 1983); these were the most

clearly-defined outcome measures available in the two surveys.

The activity limitation measures for both surveys consisted of three response categories: none, some, or major limitation. The initial loglinear analysis indicated that there were significant differences between respondents with no activity limitation and those with major limitation (in this context, major limitation means inability to go about one's normal activities, e.g., work, household duties, or school). But there were no significant differences in respondents with some limitation. Consequently, we performed logistic regression on a dichotomous measure, major limitation and no limitation. The results of the regression are presented in Appendix D, Table D-1.

In the **TCHS 1983** sample, **major activity limitation** was associated with sex, age, smoking status and income: each of these four predictor variables was associated with major activity limitation when the other three predictors were held constant.

In other words, for both men and women, regardless of their age, activity limitation was associated with both smoking behaviour and income. Regardless of income, current smokers were more likely to report major activity limitation than former smokers or respondents who had never smoked. And regardless of whether they smoked, respondents with low household incomes were more likely to report major activity limitation than those with high incomes.

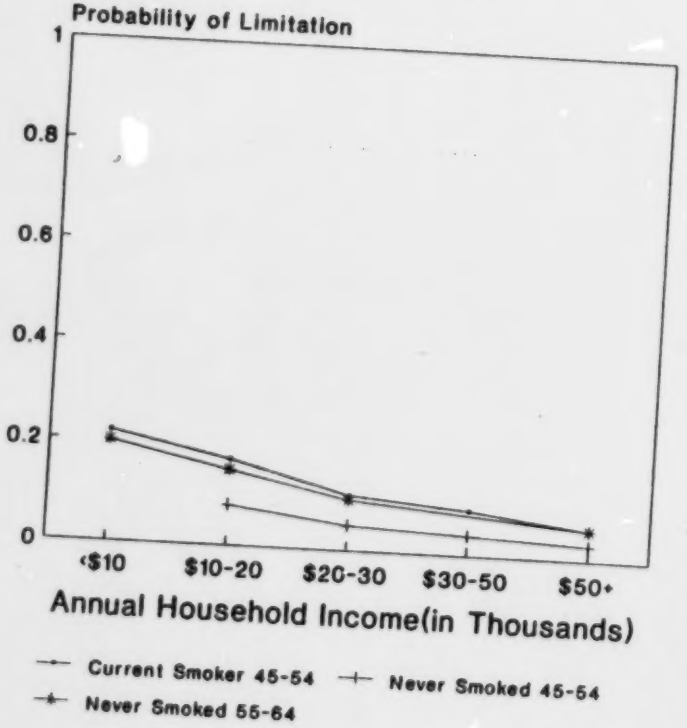
These results are presented graphically in **Figures 4-2** and **4-3**. The logistic model may be interpreted in terms of the probability of major activity limitation for specific categories of respondents. Figure 4-2 shows, for example, that the probability of major activity limitation for men between 45 and 54 years of age who were current smokers decreased as their income increased.

The same association between income and activity limitation is evident in Figure 4-2 for respondents who had never smoked, regardless of their age. But the probability of activity limitation was higher for current smokers than for respondents who had never smoked, again, regardless of age.

Figure 4-2 illustrates the overall pattern of results for activity limitation for a few categories of respondents. There are literally dozens of categories and it would be impossible to present the results for all of them. In any case, our intention is to suggest only the overall pattern, not the probability that specific categories of people will experience major activity limitation.

The results shown in Figure 4-2 might suggest, for example, that of the categories of respondents shown, men aged 45 to 54 who had

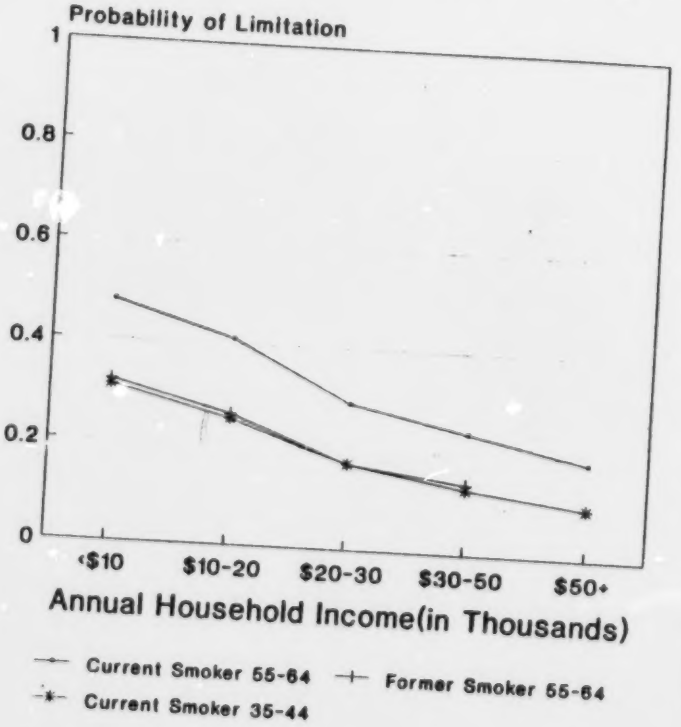
FIGURE 4-2
MAJOR ACTIVITY LIMITATION
MALES, TCHS 1983 SAMPLE



Missing values indicate no respondents with selected characteristics

HI203

FIGURE 4-3
MAJOR ACTIVITY LIMITATION
FEMALES, TCHS 1983 SAMPLE



Missing values indicate no respondents with selected characteristics

HI200

never smoked and whose household income was $50,000 or more at the time of the survey were least likely to report major activity limitation. But these results are based on a very small number of respondents in each category and we cannot reliably predict the health status of any specific category. It is the overall pattern of results that is reliable.

The same pattern is evident in Figure 4-3 for women. The probability of limitation decreased with increasing income when age and smoking status were held constant. Former smokers appeared to have reduced probabilities of activity limitation compared to current smokers.

The effect of age on the probability of major limitation for women is evident in higher probabilities for smokers aged 55-64 years compared to smokers between 35 and 44 years. Finally, the observation that younger smokers, aged 35-44 years, had almost the same probability of major activity limitation as former smokers 55-64 years of age, illustrates the deleterious effects of smoking on this health outcome.

When **activity limitation** was examined in a multivariate logistic regression for the **TCHS 1988** sample, only income and age remained in the final model. These results are presented in Appendix D, Table D-2. As can be seen from selected probabilities of major activity limitation in **Figure 4-4**, increasing income decreased the probability of limitation, regardless of age. However, the effect of age is also evident. Even holding income constant (i.e., comparing probabilities within income categories), the probability of activity limitation is higher for older respondents than for younger respondents.

Logistic regression for **chronic health conditions** yielded very mixed results. These are presented in Appendix D, Table D-3 for **TCHS 1983** data. The backward elimination technique failed to produce a satisfactory regression model of chronic conditions for TCHS 1988.

Interestingly, the procedure retained the same predictor variables in the final regression model of chronic conditions for TCHS 1983 as for activity limitation in that sample. The results are presented in **Figures 4-5** and **4-6**. Reporting health problems was associated with being female, increasing age, and with smoking status. The probability of reporting a chronic condition was higher for female smokers aged 45 to 54 years than for male smokers the same age, regardless of income levels. The tendency for increasing age to raise the probability of reported chronic conditions when smoking status and income were held constant is also evident.

FIGURE 4-4
MAJOR ACTIVITY LIMITATION
BOTH SEXES, TCHS 1988 SAMPLE

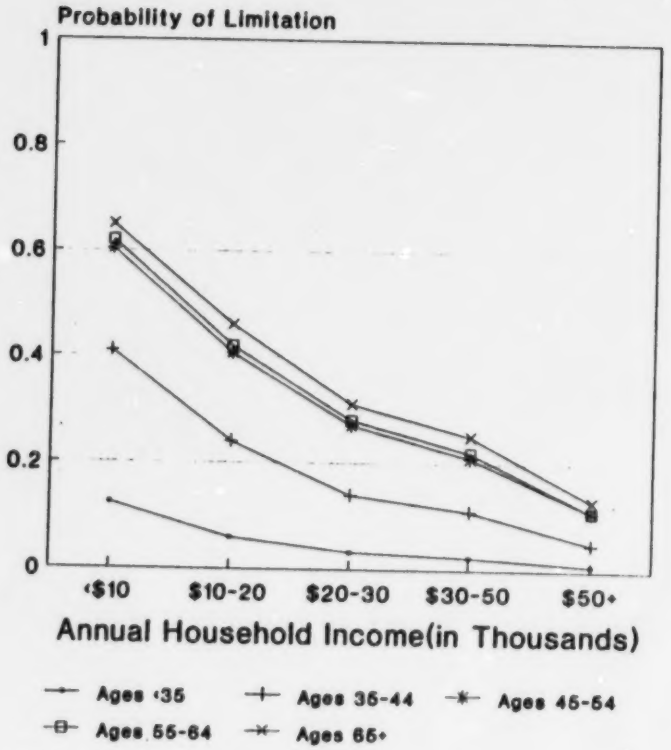
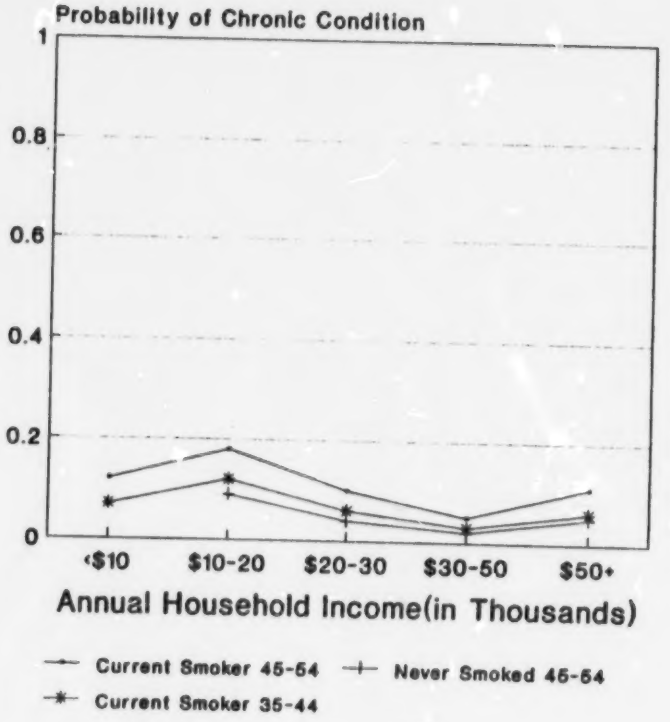
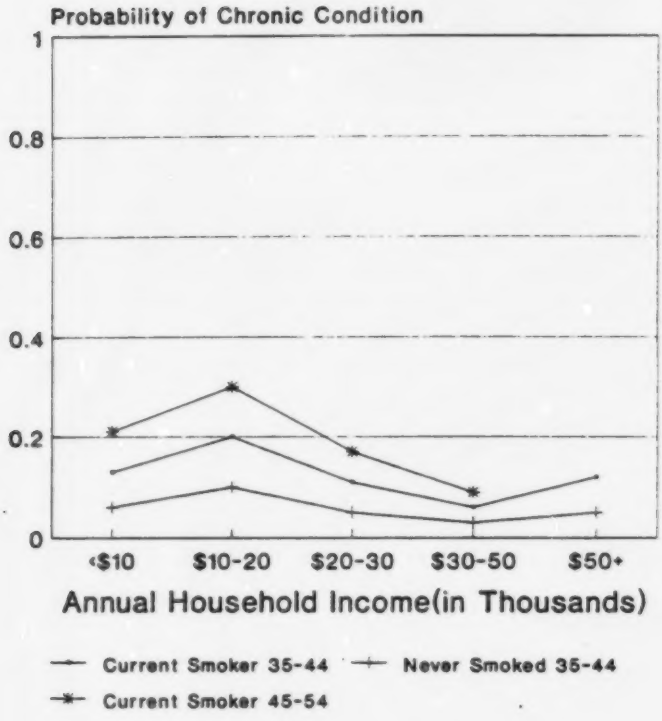


FIGURE 4-5
CHRONIC HEALTH CONDITIONS
MALES, TCHS 1983 SAMPLE



Missing values indicate no respondents with selected characteristics

FIGURE 4-6
CHRONIC HEALTH CONDITIONS
FEMALES, TCHS 1983 SAMPLE



Missing values indicate no respondents with selected characteristics

Figures 4-5 and 4-6 also show that smokers were more likely to report chronic health problems than respondents who had never smoked, regardless of sex, age and income. Former smokers in TCHS 1983 had a higher probability of chronic conditions than those

the two other smoking categories, when sex, age and income were held constant (not shown).

However, the probability of reporting chronic conditions did not increase in a linear fashion with increased income. Figures 4-5 and 4-6 show that respondents with annual household incomes of $10-20,000 had the highest probability of chronic conditions, when all other variables were held constant. They were followed by respondents with incomes of less than $10,000 and, surprisingly, those in the highest income category exhibited the third highest probability of health problems.

in Psychological well-being (as measured in TCHS 1983 by the Brief Psychological Well-Being scale) was associated with income, country of birth, marital status, self-perceived health status and activity limitation. This model was statistically significant but it explained only 15 percent of the variance in BPWB scores. More important, the standard deviation of the estimate of BPWB from this model was of the same magnitude as the standard deviation of BPWB on its own. In other words, simply knowing the distribution of BPWB scores in a population would enable one to predict any individual's score with as much accuracy as knowing their income, country of birth, marital status, etc.

We were unable to find satisfactory multivariate models for the TCHS 1988 symptoms outcome, for self-perceived health status in either sample, or for the single-item happiness measure in TCHS 1988.

4.4 Discussion and Conclusions

Multivariate analyses of the TCHS 1983 and 1988 data provide some support for the hypothesis that risk factors and risk conditions are associated with poor physical health outcomes.

Low socioeconomic status (as measured by income categories), increasing age, being female, and smoking were associated with major activity limitation in the TCHS 1983 sample. Income and age were associated with major activity limitation in the TCHS 1988 sample. Income, age, sex and smoking behaviour were also associated with chronic health conditions in TCHS 1983, although the findings for income were somewhat unclear.

Adding the other predictors in our conceptual model to the multivariate analysis made no difference, however. The other indicators of socioeconomic status (education and occupation), ethnocultural differences, social support and health behaviour (drinking and physical activity) appeared not to be associated with physical health status when we controlled for age, sex, income and smoking status. Nor did it help to add chronic health conditions and symptoms as predictor variables to the model for activity limitation.

Despite their mixed nature, our findings for activity limitation and chronic health conditions are consistent with the results of a 1984-85 British national health survey of approximately 6,500 individuals. Here, investigators found that low levels of social and economic resources and unhealthy behaviours were associated with poor health (Blaxter, 1990). Health was measured on four dimensions in this survey: fitness level based on physiological measurements, disease and impairment based on reported medical

conditions and disability, reported physical symptoms and reported psychosocial symptoms.

Perhaps the most significant finding in the British study was that risk behaviours appeared to have more impact on individuals from favourable environments and social circumstances. Healthy behaviour appeared to enhance the health status of socially advantaged individuals to a greater extent than unhealthy behaviour reduced the health status of the disadvantaged. These findings led investigators to conclude that "only in the more favourable circumstances is there 'room' for considerable damage or improvement by the adoption of voluntary health-related habits".

We can learn from our negative findings, as well.

Despite trends that were evident at the bivariate level of analysis, we were unable to find associations in the multivariate analysis between the predictor variables and the psychological well-being and self-perceived health outcomes. There were no associations at the bivariate level of analysis between the predictors and symptoms in TCHS 1983; and bivariate associations between the predictors and symptoms in TCHS 1988 did not hold up in the regression analysis. Similarly, bivariate associations between the predictors and chronic conditions in TCHS 1988 did not persist in the multivariate analysis.

There is a striking pattern here. The predictor and outcome variables for which we found results were, without exception, the ones for which we had good indicators. There is no mistaking the meaning or measurement of age and sex. Smoking status was also clearly defined, as was activity limitation. These are well-validated measures. The TCHS 1983 chronic conditions indicator referred to a smaller, more comparable set of conditions than our TCHS 1988 chronic conditions indicator.

Income is the only possible exception to this pattern. We do not believe that we adequately captured this dimension of TCHS respondents' socioeconomic status (nor do most surveys). On the other hand, there is no question that any respondent whose household income was less than $20,000 during the five-year study period was living in straitened circumstances. For income to appear as consistently as it did in the results for activity limitation and chronic conditions suggests that we have, to some extent, measured this phenomenon.

We have serious concerns about the measurement of the other predictor variables. Ethnocultural indicators, i.e., country of birth, language, and visible minority status were dichotomized. While these relatively crude indicators may provide some information about ethnocultural differences, they do not reflect

the complexity and multidimensionality of the concept (Edwards & Doucette, 1987). In any case, none of these indicators provide information about an individual's ethnic salience, that is, the extent to which they identify with an ethnic group (Disman, 1988).

The lack of a consistent meaning of education over age cohorts may partly account for the failure of this variable to predict variation in the health outcomes examined in the TCHS analyses. Educational attainment varies by the age cohort of the individual (Liberatos, Link & Kelsey, 1988). For example, completion of high school is much more common today than it was 20 years ago, but this does not necessarily mean that younger individuals with high school diplomas have higher social status than those from another generation who have not completed secondary school.

Health behaviours tend by their very nature to influence health status over time and it is difficult to capture adequately the effects of a lifetime of exposure with measures taken at one point in time. This may explain, in part, why drinking and exercise did not appear in any of the final models.

Bivariate associations between social support indicators and health outcomes disappeared after other variables were controlled in the multivariate analysis. Although structural, or quantitative, measures of social relationships, such as the index used in this analysis, have exhibited relatively consistent relationships with mortality risk and psychological outcomes, their adequacy in predicting physical morbidity remains problematic (Berkman, 1985). The use of these measures, in conjunction with qualitative indicators of social relationships (e.g., perceived degree of support, type of support, etc.) and social network variables (e.g., size, density, homogeneity, reciprocity of relationships, etc.), may represent social relationships more adequately (House, Umberson & Landis, 1988).

Finally, the measurement of some of the health outcomes chosen for the analyses may have been problematic. For TCHS 1983, it was necessary to construct a measure of symptoms from a series of items that we inferred to be self-diagnostic, rather than from a series of items that had been validated through previous research. Similarly, one question concerning level of happiness is unlikely to capture population differences in psychological health.

In fact, all of our health status outcomes reflect only a limited range of what is, doubtless, a multidimensional concept. Moreover, health as a dynamic, fluid state encompassing subjective dimensions of human experience, as well as their objective manifestations in the body, may not be adequately represented by a "snapshot" assessment based on a limited series

of measures. Panel, or prospective, studies that gather data on people's health experiences over time, may provide a more accurate means of assessing the health of communities.

Some of the measurement issues that we have just enumerated could be addressed with further analysis of TCHS 1983 and 1988 data. However, many of these issues are secondary to the question of whether the data are sufficiently representative of the City's population to warrant more detailed analysis.

If we visualize the responses to any particular question in a survey as falling on a continuum, and then chop off large chunks from one or both ends of the continuum, we can better appreciate the implications of an unrepresentative sample for our analysis. The chopped off bits represent the responses we missed from people we failed to interview.

Among the people we successfully interviewed, each respondent occupies a specific position on the continuum for each question. Picture the intersection that he or she occupies on the continua for two questions. And for three ... Now think of how many intersections are missing because of the people we did not interview. Do they form a pattern? If they do, that pattern may not be evident in a simple bivariate analysis, and so there will appear to be an association between a predictor and an outcome variable. But the pattern of missing responses may well be evident in a multivariate analysis. It may form part of the pattern that we have hypothesized with our conceptual model.

We are referring, of course to the amount of variability in the data. If there is too little variability (and that is true by definition in unrepresentative samples), even the best indicators will not reveal the pattern that is not there.

The resources that are necessary to conduct a survey that will find these complex patterns are probably beyond the capability of any local health unit.

CHAPTER FIVE

PATTERNS OF HEALTH INEQUALITIES

5.0 PATTERNS OF HEALTH INEQUALITIES

5.1 Introduction

In the previous three chapters we reported in detail on three studies that were carried out especially for this report. The objective in these studies was to take data that are readily accessible to the Department of Public Health and to look at them closely to see what they could tell us about inequalities in health status in the City of Toronto. On the one hand, the results of all three studies pointed to the existence of health inequalities. On the other hand, there were serious limitations in the data and methods of each study, making it very difficult to assess the nature and extent of health inequalities. Based on these studies, the best that can be said is that there is modest, but consistent evidence of inequalities in health status in the City of Toronto.

In this chapter we summarize the three studies one by one and review their inadequacies. We then discuss the results as a whole, and consider them in light of the socioenvironmental approach that was outlined in the first chapter. Finally, we discuss some of the implications for future research into health inequalities.

5.2 Three Studies: Summary and Critique

5.2.1 Country of Birth and Mortality

More than 25,000 City of Toronto residents died during the five-year period 1984 through 1988. Slightly more than half of those who died were foreign-born residents; just 48.4 percent had been born in Canada. The first study (see chapter two for details) looked at whether there are any differences in the mortality experience of people born in different countries. Are there differences in how soon people die or what they die from, depending on their country of birth?

The City of Toronto Department of Public Health keeps records of each City resident who dies. Death certificates are checked carefully to see what people died from, how old they were at the time, their place of residence when they died, their sex, and the country where they were born. In this study, death certificate information was used for all of the deaths that occurred from 1984 through 1988. We also used information from the 1986 census about the number of men and women in different age groups who were born in each country and who lived in the City of Toronto.

We wanted to know whether there are ethnocultural differences in mortality. We knew from the start that country of birth is not a very good indicator of ethnocultural differences, but it was the only indicator available in this large database. It was only by actually doing the study that we discovered a second problem: there are really very few deaths among City of Toronto residents born in any one country for any one cause of death or even from any major category of disease. As a result, we had to combine most countries into regions which further weakened the relation to ethnicity and culture.

Death rates for men and women were calculated separately for the following 10 countries or regions of birth: Canada, United States, United Kingdom, Greece, Italy, Portugal, other European countries, Caribbean, China, Hong Kong and Taiwan; and other Asian countries.

To compare the mortality experience of men and women born in these countries and regions, it is necessary to examine death rates rather than the number of deaths, and to adjust the rates to take account of differences in the age structure of each group. Thus, we can examine the number of deaths per thousand Italian-born Toronto men, and we adjust that number to take account of the number of men in different age groups in Toronto's Italian community.

The rates for all 10 countries and regions were adjusted (i.e., standardized by the direct method) to the age structure of the population of the City of Toronto as a whole. The death rates for the 10 countries or regions are therefore comparable to one another and are only meaningful in that comparative context. From now on, when we talk about death rates for the ten countries or regions we will be using these adjusted or standardized rates.

In general, we found that the death rates for Canadian-born Toronto residents tended to be higher than the death rates for Toronto residents born in Greece, Italy, Portugal, other European countries, the Caribbean, China, Hong Kong and Taiwan and other Asian countries. The death rates for Toronto residents born in the United Kingdom tended to be relatively similar to the rates for Canadian-born residents and this was also apparent to a lesser extent for residents born in the United States and in European countries other than Greece, Italy and Portugal. These general patterns were essentially the same for men and for women.

Just one of the results was statistically significant. We can say with considerable certainty that Toronto men who were born in Greece were less likely to die during the study period than were Canadian-born Toronto men. Figure 2-1 shows this result. The death rate for Canadian-born men for all causes of death

combined was 10.8 deaths per thousand compared with a rate of 5.7 deaths per thousand Greek-born men.

The difference between these two rates is unlikely to be simply due to chance. The bars shown in Figure 2-1 represent 95 percent confidence intervals. While we estimate the death rate for each country or region (shown as an x), we can be confident only that the actual rate falls somewhere within the bar. If the bars for any two countries or regions overlap, it is possible that there is no real difference in the rates.

The confidence intervals for death rates for Canadian-born and Greek-born men are the only two that do not overlap, although several others have little overlap. Thus, death rates for men born in Italy, Portugal, other European countries, China, Hong Kong and Taiwan are very likely lower than the rates for Canadian-born men.

We cannot say with confidence that any of the rates for deaths from all causes are really different for women (Figure 2-2), although the rates for women born in China, Hong Kong and Taiwan are very likely lower than the rates for Canadian-born women. The rates for women born in Italy, Portugal and other Asian countries may be lower, as well.

Tables 2-1 through 2-4 in chapter two summarize the rest of the results. If the estimated death rate is higher or lower than the rate for Canadian-born men or women we show a plus or minus. If the rate is relatively close to or far away from the rate for Canadian-born residents but may be due to chance, we show a 'c' or an 'f'. These results could have occurred by chance.

Despite the lack of statistically significant results, it was impossible to ignore the consistent patterns in the data. For all the major categories of disease (circulatory, cancers, respiratory, digestive system, accidents and injuries, and ill-defined symptoms and signs) and for specific causes (heart attack and other ischemic heart diseases, stroke, lung cancer, pneumonia, and breast cancer), the tables are filled with minus signs. With few exceptions, death rates are lower for men and women born outside Canada.

The major exception that formed a pattern was the U.K., which more often than not was closer to the rates for Canadian-born residents than any of the other rates. Death rates for Toronto residents born in the U.S. and in European countries other than Greece, Italy and Portugal were often close to Canadian-born rates, as well.

It is sometimes difficult to get results that are significant in both statistical and substantive terms. We would probably have

had statistically significant results if we had compared the death rates for Canadian-born Toronto residents with the death rate for all foreign-born residents combined. But that result would have taken us so far away from our original concern with ethnocultural differences as to be meaningless.

It appears that in general, people who emigrate to Canada from various parts of the world may be healthier than Canadian-born Toronto residents. This is consistent with the findings of other researchers who describe it as the "healthy immigrant" phenomenon. For most immigration categories, good health is a requirement and as a practical matter, it takes reasonably good health to emigrate. The question of whether there are also ethnocultural differences in health status is still open, although there is some hint of ethnocultural differences in the fact that the rates for Toronto residents born in Canada, the U.K., the U.S. and in other (primarily northern) European countries were very similar. To address this question directly will require a very different research strategy, a point to which we return in Section 5.3.

5.2.2 An Ecological Analysis of Mortality

Ecological analysis is the name given to a research method that is widely used in the field of public health. Until recently, we had very little information about the health of individuals in the communities we serve. If we had information about social indicators such as their socioeconomic status and ethnocultural background, we did not have information about their health status, so that it was impossible to study the relationships between the two.

But we have had a great deal of information about the census tracts or neighbourhoods that people live in. Statistics Canada collects information about social indicators every five years in the Census and makes it readily available in the form of summary statistics or profiles of census tracts. Health agencies can then use vital statistics data (such as deaths) that are also readily available, and with some effort can usually classify each death according to the census tract where the deceased person lived at the time of their death.

Any study of relationships at the area rather than the individual level is called ecological analysis. In most cases the "area" is the census tract because we know so much about census tracts. In this study, we looked at the relationship between the social characteristics of City of Toronto census tracts and their mortality experience during the five-year period 1984-88 (see chapter three for details).

We wanted to know whether poorer census tracts had higher death rates than more affluent census tracts. We also wanted to know whether other socioeconomic characteristics of an area were related to its mortality experience, specifically the level of education and occupational status of its residents. Finally, we wanted to know whether the ethnocultural character of a census tract would change the nature of any of these relationships.

There are 134 census tracts in the City of Toronto that were relatively stable during the 15 years prior to the study period and that had at least 500 residents; most had between 2,500 and 8,000 residents. We calculated death rates for each census tract using the procedures described in Section 5.2.1 above, except that we calculated rates for both sexes combined as well as for men and women separately. The death rates for men and women were adjusted for the age structure of each census tract, and the rates for both sexes combined were adjusted for both age and sex structure.

Census tracts were then rank-ordered according to the percent of its population living below the poverty line and divided into quintiles or fifths. The average death rate for the highest quintile, that is the poorest census tracts, was then compared with the average death rate for the lowest (most affluent) quintile of census tracts. These results are shown in Table 3-2.

The poorest areas had higher death rates for both men and women for all causes of death combined and for circulatory disease, respiratory disease, diseases of the digestive system and accidents and injuries, and for men for all kinds of cancers combined.

The death rates for men were higher in the poorest areas for most of the specific causes of death that we studied, including lung cancer, heart attack, stroke, pneumonia, chronic bronchitis, emphysema and asthma, cirrhosis of the liver and other diseases of the digestive system, suicides, and all other accidents and injuries excluding motor vehicle accidents.

Death rates for women were higher in the poorest areas for breast cancer, heart attack, stroke, pneumonia (though only slightly), diseases of the digestive system other than cirrhosis of the liver, and accidents and injuries excluding motor vehicle accidents.

There were so few deaths from diabetes mellitus and from falls that we had to calculate death rates for both sexes combined; in both cases the death rates for the poorest areas were higher than the rates for more affluent areas of the City.

A more elaborate analysis of the data was then carried out in order to find out whether other socioeconomic and ethnocultural conditions are related to the mortality experience of an area. This analysis confirmed many of the above findings and suggests as well that the effects of poverty may be most severe for people who live in predominantly anglophone areas with low socioeconomic status. These results are portrayed in Figures 3-11 through 3-20.

Living in an ethnic area, that is an area where most people's first language was a language other than English or French, appeared to be associated with better health. We also found that other socioeconomic conditions, specifically low levels of education or occupational status, were better predictors in some cases than poverty. For women especially, level of education and ethnicity accounted for much of the difference in death rates among City of Toronto census tracts. There are serious problems in the measurement of these conditions, however, and we will return to this point.

We used a statistical technique called ordinary least squares regression for this analysis. With this technique, we were able to look at the association between the amount of poverty and the mortality experience of census tracts, at the same time taking into account the educational level and occupational status of each census tract, as well as the percent of its population with a non-English or French first language. Thus, for each of the major categories of disease as well as for most of the important specific causes of death, we were able to determine which of these conditions appeared to be related to the mortality experience of City of Toronto census tracts.

The analysis confirmed that poverty was associated with death from lung cancer, and from accidents and injuries, for both men and women. When we combined deaths for men and women (because of the relatively small number of deaths), poverty was associated, during the study period, with death from chronic liver conditions and from suicide.

Among men, the regression analysis confirmed that poverty was associated with death due to diseases of the circulatory, respiratory and digestive systems, and to accidents and injuries.

For women, the analysis confirmed that the relationship between poverty and death from lung cancer, accidents and injuries may have been influenced by ethnocultural conditions. For men, other socioeconomic and ethnocultural conditions may have influenced the relationship between poverty and death from circulatory and respiratory conditions.

While the regression analysis found no significant association between poverty and death from circulatory diseases in women, it did reveal a fairly strong association with other socioeconomic and ethnocultural conditions.

Despite the obvious pattern in these results, it is difficult to know how seriously to take them. Ecological analysis is notorious for the ecological fallacy, that is, the mistake of assuming that associations that appear to exist at the census tract level necessarily exist in individuals as well. There is clearly an association between the amount of poverty in census tracts and their mortality experience. But we cannot say on the basis of this study that a poor person will die sooner than a person who is affluent.

The most we can say is that a person who lives in a poor area may die sooner than a person who lives in an affluent area. Social scientists argue that the only variables that should be used in ecological analysis are contextual variables. These are properties of areas or groups, not of individuals, but they affect the individuals who live in an area or belong to a group. Poverty is definitely a contextual variable: poverty is both an attribute of persons as well as a condition or context that people live in. There are poor areas in the City of Toronto and living in those areas may be a risk condition, although common sense suggests that it is more of a risk condition if you are poor than if you are well off.

The ethnocultural character of an area is also a contextual variable. If a member of a particular ethnocultural group lives in an area that is heavily-populated by other members of the same group, they are far more likely to subscribe to the cultural values and practices of the group. That is why we talk about culture shock when people suddenly find themselves in the midst of an alien culture, and acculturation when a person gradually adapts to a different cultural environment.

We know that ethnocultural groups tend to cluster geographically in urban areas and we have even been able to map these clusters for specific groups in the City of Toronto. Because there are so many different groups, their numbers in most census tracts are very small and it was impossible to look at the association between death rates and the specific ethnocultural characteristics of an area across all census tracts.

The best we could do was to characterize census tracts in terms of the percentage of their population with a first language other than English or French. This is not a contextual variable per se but since areas with a large percentage of residents with non-English/French first language may well have large concentrations of specific ethnic groups, it is an acceptable proxy variable.

The results raise more questions about the role of ethnocultural conditions than they answer, however.

While the results of this study are quite compelling with respect to the relationship between poverty and health, the other findings are very tenuous. They suggest the need for further research, and we return to this point in Section 5.3.

5.2.3 Survey Research on Risk Factors and Risk Conditions

Data from community health surveys would seem to offer the possibility of directly assessing the relationships among health status and behavioural risk factors, psychosocial risk factors and socioenvironmental risk conditions. Our third study used data from two community health surveys that were conducted in the City of Toronto at the beginning and end of the five-year study period (see chapter four for details).

When the first Toronto Community Health Survey (TCHS 1983) was conducted, survey research was a relatively new method for assessing health status. TCHS 1983 was the first local health survey of its kind in Canada and there were great hopes that it would provide the kind of information needed to plan public health programs. Nearly 1,000 people were questioned about their health practices, health status and social background in 30-minute telephone interviews. A technique called random digit dialling was used to obtain a random sample of City of Toronto households with telephones and one member of each household was randomly selected for an interview.

Although 80 percent of these individuals completed the interview, the sample was not entirely representative of the City's population. The sample tended to under-represent the groups in society which are most exposed to risk factors and risk conditions and therefore most likely to be health disadvantaged, including the predominantly male transient and rooming house population of the City's core and people who were unemployed at the time of the survey. Not surprisingly, the survey over-represented people with relatively high incomes and educational levels.

Perhaps most disappointing was the fact that residents whose first language was other than English or French were under-represented. Portuguese, Italian, Chinese and Greek residents were adequately represented because the interview was offered in the language of their choice, but it was simply not possible to offer this choice to everyone.

Despite these limitations the survey proved to be useful and it was repeated five years later. TCHS 1988 used essentially the

same sampling technique and also interviewed just under 1,000 City of Toronto residents. The questionnaire was improved, especially with the addition of measures of social support. In the interim, however, telephone surveys had become much more common, especially for market research. The survey achieved just a 51 percent response rate and was even less representative of the City's population than TCHS 1983.

There is evidence of health inequality in the two surveys but, because of these problems, the results must be interpreted very carefully.

Both surveys asked respondents about their socioeconomic status and ethnocultural background, specifically their household income, level of education, occupational status, race, and country of birth. TCHS 1983 asked respondents what language they had first learned and still understood and TCHS 1988 asked what language they currently used most of the time at home. TCHS 1988 also asked whether respondents rented or owned their home. Both surveys asked about occupational exposures to health risks.

Questions were asked in both surveys about several aspects of health status. Both surveys asked respondents how they perceived their health status in general terms. Both also asked about symptoms such as shortness of breath and about specific chronic health problems such as heart trouble, cancer, diabetes, emphysema and chronic bronchitis. Several questions were asked in both surveys to determine whether respondents suffered from any kind of activity limitation or disability. TCHS 1983 asked about psychological well-being with a brief set of questions and TCHS 1988 asked a single question about respondents' general level of happiness.

Both surveys asked respondents their age and sex, of course. And both surveys asked a large number of questions about behavioural risk factors: smoking, drinking and physical activity.

Because of the increasing importance attached to psychosocial risk factors, TCHS 1988 included a validated measure of social support. The only psychosocial support measure in TCHS 1983 was marital status.

We wanted to know whether there was an association among health status and socioeconomic and ethnocultural conditions. More important, we wanted to know whether that association would persist when age, sex, risk behaviours and social support were taken into account. Are poor smokers more likely to experience health problems than affluent smokers of the same age and sex, for example? Several different regression techniques were used to address these questions, depending on the type of health status measure.

The most important finding was for activity limitation. In TCHS 1983, sex, age, smoking behaviour and income were associated with activity limitation. Figure 4-2 shows, for example, that the probability of major activity limitation for men aged 45 to 54 who were current smokers decreased as their income level increased. The same general pattern was evident for women (Figure 4-3): when age and smoking behaviour were held constant, the probability of major activity limitation decreased as household income increased.

In TCHS 1988, only age and income were related to activity limitation. Not surprisingly, age was associated with activity limitation when household income was held constant. But regardless of age, the probability of activity limitation decreased as income level increased.

There is clear evidence here that income is associated with activity limitation, although it is impossible to say whether TCHS respondents were more likely to experience activity limitation because their income was inadequate or the reverse, that is, people whose activity is limited are unable to earn an adequate income.

The only other significant finding in this study was that chronic health problems as measured in 1983 were associated with sex, age, smoking behaviour and income. Interestingly, these are the same variables that were associated with activity limitation in TCHS 1983. Survey respondents were more likely to report a chronic health problem if they were women and if they were older, even when smoking behaviour and income were held constant.

The association between income and chronic health problems was complex. Respondents with annual household incomes of $10-20,000 had the highest probability of chronic health problems, when age, sex and smoking behaviour were held constant. They were more likely to report health problems than respondents with incomes less than $10,000; those with incomes in excess of $50,000 were more likely to report problems than respondents with incomes in the $20-40,000 range. This was true regardless of respondents' age, sex or smoking status.

Chronic health problems in TCHS 1988 were not associated with socioeconomic or ethnocultural conditions when other factors were taken into account. Nor were any of the more subjective measures of health status, that is, self-perceived health, psychological well-being or even symptoms such as shortness of breath associated with socioeconomic or ethnocultural conditions when we controlled for all of the other factors.

That is not to say that age or sex alone, or risk behaviours, or even income alone were not associated with most of these health status outcomes. In chapter four we report a wealth of these bivariate relationships. But our primary task in this study was to see whether the association between health status on the one hand and socioeconomic status and ethnicity on the other would hold up when all of these other factors were taken into account.

The results are modest, indeed. If research into health inequalities is to become a priority for public health, and we believe it must, it is disappointing to find a major tool in the health research tool bag so ineffectual. We return to this point in the next section.

5.3 Searching for Patterns

Taken one at a time, the three studies raise more questions than they answer. The data and methods of each study are flawed in some way and prudent readers may be more impressed with a given study's inadequacies than with its results. Taken together, however, the results of the three studies form a pattern, and for this reason we believe they are credible.

In all three studies we found substantial differences in health status among City of Toronto residents. Both the individual-level and ecological analyses of mortality data found ethnocultural differences in health status. In a sense, the results of the individual-level analysis of mortality data validate the ecological analysis. Both the ecological analysis of mortality data and the analysis of Toronto Community Health Survey data found socioeconomic differences in health status.

5.3.1 Heart Health Inequality

Nearly 40 percent of the deaths that occurred in the City of Toronto during the study period were due to circulatory disease, including heart attack and stroke. Heart attack and the other forms of ischemic heart disease are still the leading cause of death in the City despite the significant decrease in deaths from this cause during the past decade (City of Toronto, 1989). In all three studies, we found evidence of heart health inequality.

Canadian-born Toronto residents were more likely to die from circulatory disease during the study period than any group of foreign-born Torontonians we studied, with the possible exception of men and women born in the U.K., U.S., and European countries other than Greece, Italy and Portugal. Mortality rates for circulatory disease in men were highest during the study period in poor areas of the City that were predominantly anglophone and

had very few people in high status jobs. Mortality from ischemic heart disease in general was strongly associated with income for men; death from heart attack in particular was also associated with income in men, although somewhat less strongly.

Among women, death from circulatory disease appeared to be associated with another aspect of an area's socioeconomic status, namely the level of education of its residents. Living in an area with a large proportion of residents whose first language was other than English or French tended to reduce the impact of low levels of education, however. This appeared to be the case for death from all types of circulatory disease combined and for ischemic heart disease, the major type of circulatory disease, but not for heart attack.

For the analysis of survey data, we had to combine several chronic health conditions, including heart trouble. In 1983, 12 percent of TCHS respondents over the age of 22 said they had been diagnosed with one or more of the following conditions: heart trouble, diabetes, emphysema, chronic bronchitis or cancer. In one of just two significant findings in our analysis of TCHS data, we found that the presence of one or more of these conditions was associated with age, sex, smoking behaviour and income. When age, sex and smoking behaviour were held constant, a complex pattern of association with income emerged.

The fact that there are significant inequalities in mortality from circulatory disease and perhaps in the incidence of these conditions as well suggests that it is possible to further reduce the number of deaths from this cause. This point was made in a recent issue of Chronic Diseases in Canada (Wong and Wilkins, 1990). Provinces with relatively low mortality rates from the major causes of death were taken as an indication of what is possible; provinces with higher death rates were then considered to have an excess of deaths. In keeping with the prevailing view of health, the authors conclude that an increased focus on behavioural risk factors is required. Our results, coupled with the socioenvironmental approach to health suggest a different focus, however.

Risk conditions require as much attention as risk factors. Living in the midst of poverty, where most of the people around you have an inadequate education and low status jobs, may be harmful to your health. The socioeconomic disparity that exists in Toronto may be a risk condition in itself. The framework we set out in the first chapter suggests that changing these conditions may directly affect the health status of Torontonians. Changing these conditions may also make it easier to address behavioural risk factors and psychosocial risk factors.

These results suggest that a focus on risk conditions as well as risk factors would help to reduce death from circulatory disease and perhaps the occurrence of these conditions as well. Paradoxically, we can speak with some confidence about circulatory disease precisely because so many people die from it.

The results are less clear for other chronic health conditions, perhaps because there are fewer data. But there is some evidence that diabetes, lung cancer, respiratory disease, accidents and injuries - especially suicide, and diseases of the digestive system may also be sensitive to risk conditions.

5.3.2 Culture and Migration

In two of the studies, we tried to address the question of ethnocultural differences in health status. In one, we found that City of Toronto residents born outside Canada appeared to have lower mortality rates during the study period than their Canadian-born neighbours. In the other, we found that living in so-called ethnic areas of the City, neighbourhoods with a large proportion of residents whose first language is neither English or French, tended to moderate some of the association between poverty and mortality.

The results of these studies raise more questions than they answer. They are consistent with substantial literature on immigration and mortality (Trovato, 1990), but migrant studies raise the same questions. To what extent have we addressed the question of ethnocultural differences in health status? To what extent are lower mortality rates among immigrants an artifact of the immigration experience? In short, why do immigrants seem to have lower mortality rates than native-born residents of their host country?

The cultural values and practices of immigrants may explain part of the difference in mortality rates. Immigrants may bring with them beneficial dietary practices, a tradition that prohibits women from smoking, stress-buffering religious beliefs, and close-knit extended families. When they arrive in Canadian cities, they may create supportive communities (City of Toronto, 1989a). These cultural values and practices vary from one ethnocultural group to another, of course, and they may change as individuals become acculturated to their new social environment. But they likely have some effect on health status and ultimately, on mortality rates.

The immigration experience, broadly speaking, is probably also relevant. It is generally acknowledged that there is some degree of self-selection among migrants so that the healthiest, most

adaptive members of a society tend to be the ones who choose to move to a new land. Immigration regulations and procedures in the host country may also favour the fittest. On the other hand, the experience of migration can be traumatic for many refugees.

The immigration experience extends long after a migrant arrives in his or her host country. It can even extend into the next generation. For some, it means becoming a member of a visible minority, a potential risk condition. On the other hand, many immigrants experience the phenomenon we have called relative poverty, and for them it is a positive experience. They may be poor by Canadian standards but they are better off than most people in the country they left behind.

Some or all of these factors and conditions may explain our results. But some of these aspects of culture and migration are positive while others are negative, and they vary tremendously from one group to another, and even within groups. These differences, and their potential health effects, are masked by our data. At best, mortality rates based on country of birth and non-English or French first language are simple summary statements about ethnocultural differences in health status. They are only the first step toward elucidating these differences.

5.4 Implications for Research

We undertook three studies simultaneously because we knew none of them could directly address the issue of inequalities in health status. Although the mortality and survey data bases both included some measures of ethnicity and socioeconomic status, they were not designed to assess inequalities and the data were not collected for that purpose.

The research agenda for public health has changed dramatically in recent years. From a concern with data-based planning in general terms (City of Toronto, 1978), we have moved to a concern for equity. We are less concerned now with the health status of the general population and more concerned with the health status of specific, disadvantaged groups in society. We still want to be able to monitor trends over time, but we are equally concerned with differences that exist at any one point in time.

The research that was done for this report was an essential step toward rethinking our research strategy. It has enabled us to assess whether existing data and methods are appropriate for new research questions. As we have seen, taken one at a time, the studies were disappointing for how little they were able to tell us about inequalities in health status.

The study on country or region of birth and mortality was limited because we were faced with the choice of aggregating countries to the point where they became meaningless as indicators of ethnocultural background, or else accepting results that were not statistically significant. We chose the middle ground, and while there is a substantial pattern in the results it may say as much about the immigration experience of Toronto residents as it does about ethnocultural differences in their health status.

Mortality and country of birth are simply too insensitive as indices of health and ethnocultural differences to be able to address our research questions. We need studies that focus on specific health issues in specific ethnocultural groups. Are the dietary practices of specific groups beneficial, for example? What influences the acceptance or rejection of these practices? How do they change with acculturation? How can they be promoted?

The ecological analysis lived up to the oft-made claim for this type of study: it is a useful starting point for further research. This study suggests that some neighbourhoods in Toronto may not be healthy environments, and yet a closer look at those neighbourhoods might reveal their capacity to enhance the health of their residents, if only that capacity can be harnessed. What we need now are studies of particular neighbourhoods or communities and of the interplay there of physiological, behavioural and psychosocial risk factors and risk conditions.

We also need to look more closely at differences in the factors and conditions that underly men's and women's health. Do men and women experience poverty differently, or are traditional poverty indicators not as sensitive to differences in women's health as they are to differences in men's? How should we measure child poverty, and what are its consequences?

The TCHS study was also limited. Local community health surveys would seem to offer the potential to assess health inequalities using the socioenvironmental approach. But our experience suggests a number of reasons why they are not as well suited to this purpose as was originally thought. First, telephone surveys cannot reach disadvantaged sectors of the population and the expense of personal interviews is prohibitive for local health units. Second, general population surveys at the local level cannot obtain large enough subsamples of specific ethnocultural groups to make it possible to control for ethnocultural differences in health status, and in any case, their questions are bound to be culturally insensitive for some groups. Finally, to collect data for all of the risk factors and risk conditions requires a very lengthy instrument and to fully analyze it requires a larger sample than is feasible at the local level.

It is unlikely that we will repeat TCHS 1983 and 1988. In the future we will rely on general population surveys at the provincial or national level for baseline data on health status and for monitoring broad changes in the health status of the general population. Our major finding from TCHS data, on inequalities in activity limitation, could have been addressed with census data on disabilities, for example, and we should renew our efforts to use subsamples of national and provincial data wherever possible and to extrapolate national and provincial findings whenever appropriate.

All of these problems point to the need at the local level for well-designed, small-scale studies that focus on specific groups or specific health problems and issues. The emphasis should be on "appropriate technology," that is, on selecting research methods that are appropriate to the study of specific research questions (McKinlay, 1990). Traditional epidemiologic methods will have to be supplemented by qualitative methods that have been evolving for decades in the social sciences. More important, the choice of research method must be made on a study-by-study basis, on the grounds of what is the most appropriate way to address each particular research question. A great deal more care must go into formulating research questions and a great deal more creativity must go into determining the appropriate research method.

Public health needs a systematic research program to identify risk conditions and establish their link with health, and a commitment to use this information to advocate for social and political change. In the next section, we address the question of the role of local health units in this effort.

5.5 Conclusion

The research issues that have been raised in this report obviously cannot be addressed by local health units alone. Other levels of government, universities, research institutes and community agencies and groups all have a role to play. The City of Toronto Department of Public Health can play an important role in helping to put health equity on their agendas, and by working with them to develop a coordinated research strategy. The DPH must also continue to reformulate its own research strategy, and in doing so it should seek the advice of other interested parties. For these reasons, we recommend that:

> The Department of Public Health undertakes a formal consultation on its future role in research on health inequalities and health equity, and that it prepares a report by June 1991 with recommendations for any changes in policies and procedures that might be required.

A number of related issues should be addressed by this inquiry, including the implications of becoming a teaching health unit; the recommendation of the Report on Multicultural Access to Public Health Services that a cultural data policy be formulated; the need for better "intelligence" about new ethnocultural groups in the City; the recommendations of the Healthy Toronto 2000 report for more neighbourhood and community-oriented information; and the recommendation of the report on Family Violence that the department plays a coordinating role with respect to research in this area. Work is already underway on these issues and it should be integrated into a comprehensive approach to health equity research.

While a great deal more work needs to be done in this area, we know enough already to be clear about some of the implications for public policy. When our results are set alongside the other Canadian and international studies reviewed in chapters one through four, they provide compelling evidence of the existence of inequalities in health and inequities in access to the basic prerequisites for health. The Department of Public Health must continue to give priority to advocacy for adequate incomes, education and jobs; access to nutritious food; affordable and supportive housing; healthy neighbourhood and work environments; and cultural and political equality.

In chapter one we reviewed the public policy context of this research. That argument can be summarized as follows: we do not need more health care spending to create more health; we do not need more economic growth to create more health; but we do need more economic equity to create more health. On the strength of the research on poverty and health that has been done to date, there are public health grounds for recommending that:

> Economic, fiscal and social policies at the federal, provincial and local level be reviewed to ensure that they are health protecting and health promoting.

We recommend further that:

> The summary version of this report be distributed widely and that it be used to advocate for the appropriate changes in public policy at all levels of government.

We have argued throughout this report that new data and new indicators are required if we are to monitor inequalities in health status in the City of Toronto. We conclude with an appeal to improve the City's standing on a traditional indicator. When 1988 mortality rates are age-standardized to the same population (that is, the 1971 Canadian population), the City of Toronto has a higher rate, six deaths per thousand population, than either

Ontario (5.6) or Canada (5.7 per 1,000) (Statistics Canada, 1990). This is true despite the fact that the City of Toronto has a large foreign-born population whose mortality rates overall tend to be relatively low.

The most effective way to eliminate the gap between the mortality experience of residents of the City of Toronto and Ontario, or even Canada, may be to reduce poverty in the City.

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APPENDICES

CITY OF TORONTO

APPENDIX A

APPENDIX B

TABLE B - 1

ECOLOGICAL ANALYSIS OF MORTALITY
RESULTS OF ORDINARY LEAST SQUARES REGRESSION

	OUTCOME	MODEL[1]	ADJ.[2] R^2 (%)	INTERCEPT	PARAMETER ESTIMATE	p VALUE[3]
1.	All Causes, both sexes	a.Inc.	30	8.7	.07	.0001
		MT			-.04	.0001
		Occup.			-.09	.005
		b.Inc.	27	6.1	.10	.0001
		MT			-.02	.008
		c.Inc.	23	5.7	.09	.0001
2.	All Causes, Males	a.Inc.	31	8.9	.11	.0001
		MT			-.05	.0009
		Occup.			-.09	.04
		b.Inc.	29	6.4	.14	.0001
		MT			-.03	.009
		c.Inc.	26	5.9	.12	.0001
3.	All Causes, Female	a.Inc.	18	8.5	.03	.04
		MT			-.04	.0004
		Occup.			-.10	.002
		b.Inc.	13	5.8	.07	.0001
		MT			-.02	.04
		c.Inc.	11	5.5	.05	.0001
4.	Neoplasms, both sexes	Inc.	6	2.0	.01	.004
		MT			-.01	.03
5.	Neoplasms, Males	Inc.	9	1.8	.02	.0002
6.	Neoplasms, Females	MT	3	2.1	-.01	.02
7.	Lung Cancer, both sexes	Inc.	27	.72	.01	.003
		MT			-.01	.0001
		Occup.			-.01	.0006
8.	Lung Cancer, Males	Inc.	14	.43	.01	.0001

See footnotes at end of table.

	OUTCOME	MODEL[1]	ADJ.[2] R^2 (%)	INTERCEPT	PARAMETER ESTIMATE	p VALUE[3]
9.	Lung Cancer, Females	a.Inc. MT Educ.	20	.24	.004 -.01 .01	.02 .0001 .002
		b.Inc. MT	14	.28	.01 -.003	.0001 .0001
		c.Inc.	4	.22	.004	.01
10.	Breast Cancer, Females	MT	2	.45	-.002	.04
11.	Colon Cancer, both sexes	Inc. Occup.	3	.11	.002 .004	.05 .02
12.	Colon CA, Males	-	-	-	-	N.S.[4]
13.	Colon CA, Females	-	-	-	-	N.S.[4]
14.	Diabetes Mellitus both sexes	Inc.	4	.07	.002	.01
15.	Diabetes Mellitus Males	-	-	-	-	NA[6]
16.	Diabetes Mellitus Females	-	-	-	-	NA[6]
17.	Circulatory Diseases - both sexes	Inc. MT Educ.	24	2.1	.02 -.02 .02	.006 .001 .0001
18.	Circulatory, Males	a.Inc. MT Occup.	21	3.8	.02 -.02 -.05	.02 .003 .001
		b.Inc.	15	2.2	.03	.0001
19.	Circulatory, Females	a.Educ. MT	20	2.0	.03 -.02	.0001 .0003
		b.Educ.	12	2.0	.02	.0001
20.	Ischemic Heart Disease (incl. MI), both sexes	Occup. MT	28	2.7	-.05 -.01	.0001 .0001

See footnotes at end of table.

	OUTCOME	MODEL[1]	ADJ.[2] R^2 (%)	INTERCEPT	PARAMETER ESTIMATE	p VALUE[3]
21.	IHD, Males	Inc.	16	1.3	.03	.0001
22.	IHD, Females	a.Educ. MT Occup.	21	1.5	.02 -.01 -.02	.004 .0005 .03
		b.Educ. MT	16	.92	.02 -.01	.0001 .008
		c.Educ.	12	.92	.01	.0001
23.	Myocardial Infarction, both sexes	Occup.	22	1.1	-.02	.0001
24.	MI - Males	Inc.	11	.79	.01	.0001
25.	MI - Females	Educ.	15	.40	.01	.0001
26.	Cerebrovascular Disease, both sexes	Educ.	8	.37	.004	.0005
27.	Cerebrovascular Dis., Males	Occup.	8	.52	-.01	.0007
28.	Cerebrovascular Dis., Females	Educ. Occup.	4	.06	.01 .01	.006 .03
29.	Acute Cerebro-vascular Disease, both sexes	Educ.	4	.20	.002	.01
30.	Acute CVD, Males	Occup.	6	.28	-.01	.003
31.	Acute CVD, Females	-	-	-	-	N.S.[4]
32.	Respiratory Disease, both sexes	Inc. Educ. Occup.	9	.92	.01 -.01 -.01	.02 .006 .05
33.	Respiratory Diseases, Males	a.Inc. Educ. Occup.	10	1.3	.01 -.01 -.02	.02 .005 .02
		b.Inc.	6	.48	.01	.003
34.	Respiratory Diseases, Females	-	-	-	-	N.S.[4]

See footnotes at end of table.

	OUTCOME	MODEL[1]	ADJ.[2] R^2 (%)	INTERCEPT	PARAMETER ESTIMATE	p VALUE[3]
35.	C.O.L.D.[5] both sexes	Inc. Educ.	5	.23	.01 -.003	.007 .02
36.	C.O.L.D., Males	Immig. MT	5	.30	.05 -.004	.003 .04
37.	C.O.L.D.,Females	-	-	-	-	NA[6]
38.	Pneumonia, both sexes	Inc.	5	.18	.003	.005
39.	Pneumonia, Males	Inc.	5	.19	.005	.005
40.	Pneumonia, Females	-	-	-	-	N.S.[4]
41.	Disease of Digestive System, both sexes	Inc.	14	.18	.01	.0001
42.	Digestive Dis., Males	Inc.	12	.19	.01	.0001
43.	Digestive Dis., Females	Inc.	6	.17	.01	.004
44.	Digestive Dis., exc. Ch.Liv. Dis. & Cirr., both sexes	Inc.	9	.12	.004	.0002
45.	Digestive Dis., exc. Ch.Liv. Dis. & Cirr., Males	Inc.	6	.10	.004	.003
46.	Digestive Dis., exc. Ch.Liv. Dis. & Cirr., Females	Inc.	4	.15	.005	.009
47.	Chronic Liver Disease & Cirr., both sexes	Inc.	10	.06	.004	.0001
48.	Ch. Liver Dis. & Cirr., Males	Inc.	7	.09	.005	.001
49.	Ch. Liver Dis. & Cirr., Females	-	-	-	-	NA[6]

See footnotes at end of table.

	OUTCOME	MODEL[1]	ADJ.[2] R^2 (%)	INTERCEPT	PARAMETER ESTIMATE	p VALUE[3]
50.	Accidents & Injuries, both sexes	Inc. MT	22	.32	.02 -.004	.0001 .02
51.	Accidents & Injuries, Males	Inc.	20	.33	.02	.0001
52.	Accidents & Injuries, Females	a.Inc. Immig.	10	.21	.01 -.03	.0001 .04
		b.Inc.	7	.18	.01	.0009
53.	Accidents & Injuries exc. Motor Vehicle, both sexes	Inc. MT	19	.29	.02 -.004	.0001 .01
54.	Accidents & Injuries exc. M.V., Males	a.Inc. MT	21	.36	.02 -.004	.0001 .03
		b.Inc.	19	.29	.02	.0001
55.	Accidents & Injuries exc. M.V., Females	Inc. MT	8	.22	.01 -.004	.0004 .04
56.	Falls	-	-	-	-	N.S.[4]
57.	Falls	-	-	-	-	NA[6]
58.	Falls	-	-	-	-	NA[6]
59.	Suicide, both sexes	a.Inc. Educ.	17	.12	.005 -.002	.0001 .01
		b.Inc.	13	.09	.004	.0001
60.	Suicide, Males	Inc.	7	.15	.005	.001
61.	Suicide, Females	-	-	-	-	NA[6]

See footnotes at end of table.

Footnotes

1. Low Income, First Language, High Occupational Status, Low Level of Education, Immigration Status, See Section 3.2.

2. Adjusts for the number of parameters in the model. See SAS System for Linear Models, 1986 Edition, p.15.

3. For parameter estimates (Type II Sum of Squares), Ibid, pp. 15-16.

4. No model met .05 significance level.

5. Chronic Obstructive Lung Disease.

6. Not available because of small number of cases.

APPENDIX C

SAMPLE CHARACTERISTICS, TCHS 1983 AND TCHS 1988

1. *DEMOGRAPHIC CHARACTERISTICS*

	TCHS 1983 %*	TCHS 1988 %*
SEX		
Female	58.2	50.1
Male	41.8	49.9
(N)	(981)	(980)
AGE GROUP		
15-19	4.0	4.8
20-24	12.5	9.2
25-29	14.2	17.8
30-34	15.0	16.7
35-39	10.3	12.6
40-44	6.2	9.7
45-49	6.5	6.0
50-54	5.8	5.4
55-59	7.1	3.4
60-64	5.8	4.1
65-69	3.8	4.3
70-74	3.9	2.1
75+	4.9	4.2
(N)	(981)	(960)
VISIBLE MINORITY		
No	87.3	86.1
Yes	12.7	13.9
(N)	(974)	(965)
ETHNICITY		
First Language/Language Spoken in Home		
English or French	69.1	85.5
Other	30.9	14.5
(N)	(979)	(976)
Country of Birth		
Canada	55.8	59.2
Other	44.2	40.8
(N)	(981)	(980)

* Total percent may not add to 100 because of rounding error

2. *SOCIOECONOMIC STATUS*

	TCHS 1983 %*	TCHS 1988 %*
INCOME		
<$10,000	19.5	9.3
$10,000-20,000	26.0	14.2
$20,000-30,000	21.7	16.6
$30,000-50,000	19.3	26.6
$50,000 +	13.4	33.4
(N)	(911)	(869)
EDUCATION		
Secondary School or less	33.1	-
Secondary School Diploma	19.6	-
Some Post-Secondary	11.2	-
Post Secondary Certificate	13.2	-
Bachelor's Degree/Equivalent	15.6	-
One or More Graduate Degrees	7.5	-
(N)	(977)	-
No Schooling	-	0.4
Grade School	-	7.6
Some High School	-	11.2
Complete High School	-	18.6
Community College	-	17.7
Some University	-	10.2
Complete University	-	22.3
Post-Graduate	-	12.0
(N)	-	(964)
OCCUPATIONAL STATUS		
Professional	19.8	18.0
Semi-Professional/Technician	21.2	29.6
Foreman/Supervisor	8.4	2.8
Skilled Craft/Clerk/Farm Worker	17.7	15.3
Semi-Skilled Craft/Clerk	18.3	17.1
Unskilled	14.6	17.3
(N)	(876)	(835)
HOUSING TENURE		
Rent	-	58.7
Own		41.3
(N)		(973)

*** Total percent may not add to 100 because of rounding error**

3. *HEALTH BEHAVIOURS*

	TCHS 1983 %*	TCHS 1988 %*
SMOKING STATUS		
Current	35.8	30.6
Former	22.1	25.0
Never	42.1	44.4
(N)	(978)	(980)
DRINKING		
0-3 Drinks per Week	55.8	75.4
4-13 Drinks per Week	29.9	21.1
14 + Drinks per Week	14.2	3.5
(N)	(976)	(831)
PHYSICAL ACTIVITY		
Active	48.8	25.3
Moderately Active	32.5	54.1
Somewhat Active	11.4	6.5
Sedentary	7.2	14.1
(N)	(981)	(970)

4. *SOCIAL SUPPORT*

	TCHS 1983 %*	TCHS 1988 %*
MARITAL STATUS		
Married (Living Together)	39.7	39.2
Separated	5.9	4.9
Divorced	7.4	9.3
Widowed	8.5	5.5
Single	38.6	40.7
(N)	(975)	(980)
BERKMAN SOCIAL NETWORK INDEX		
1 (Low)		16.4
2-5 (Medium)		44.7
6,7 (Medium-High)		21.0
8-12 (High)		17.9
(N)		(944)

*** Total percent may not add to 100 because of rounding error**

5. *JOB EXPOSURE TO HEALTH RISK*

HEALTH RISK	TCHS 1968
Yes	26.3
No	73.7
(N)	(962)

6. *HEALTH STATUS OUTCOMES*

	TCHS 1983 %*	TCHS 1968 %*
CHRONIC HEALTH CONDITIONS		
Present	12.2	37.5
Absent	87.8	62.5
(N)	(942)	(973)
SYMPTOMS		
Present	27.6	37.5
Absent	72.4	62.5
(N)	(981)	(978)
ACTIVITY LIMITATION		
Major	10.00	10.6
Some	17.7	11.1
None	72.4	78.3
(N)	(980)	(980)
SELF PERCEIVED HEALTH		
Excellent	29.5	39.4
Good	51.0	44.9
Fair	14.8	11.7
Poor	4.7	4.0
(N)	(981)	(980)
BRIEF PSYCHOLOGICAL WELL-BEING SCALE		
0-4 (Low)	6.8	-
5-8	40.5	-
9-12 (High)	52.7	-
(N)	(968)	-
GENERAL LEVEL OF HAPPINESS		
Very Happy	-	43.8
Pretty Happy	-	46.6
Not too Happy	-	9.6
(N)	-	(970)

* Total percent may not add to 100 because of rounding error

APPENDIX D

TABLE D-1

LOGISTIC REGRESSION ANALYSIS OF ACTIVITY LIMITATION FOR TCHS 1983 SAMPLE:

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	CHI-SQUARE	PROBABILITY
Intercept	1	166.61	0.0001
Income	4	12.28	0.0154
Sex	1	3.60	0.0579
Smoking Status	2	9.06	0.0108
Age Category	4	26.31	0.0001
Likelihood Ratio	123	123.50	0.4704

ESTIMATES

VARIABLE	VARIABLE RANGE	ESTIMATE*	STANDARD ERROR	PROBABILITY
Intercept		2.022	0.156	0.0001
Income	< $10,000	-0.724	0.244	0.003
	$10-20,000	-0.422	0.224	0.060
	$20-30,000	0.114	0.261	0.662
	$30-50,000	0.356	0.300	0.236
Sex	Male	0.259	0.136	0.058
Smoking Status	Current	-0.499	0.171	0.036
	Former	0.175	0.208	0.400
Age Category	23 - 34	0.901	0.230	0.0001
	35 - 44	0.241	0.261	0.355
	45 - 54	0.222	0.287	0.439
	55 - 64	-0.476	0.249	0.056

* Estimates refer to the log odds of no major activity limitation with all other variables remaining constant.

APPENDIX D

TABLE D-2

LOGISTIC REGRESSION ANALYSIS OF ACTIVITY LIMITATION FOR TCHS 1988 SAMPLE:

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	CHI-SQUARE	PROBABILITY
Intercept	1	118.85	0.0001
Income	4	36.91	0.0001
Age Category	4	49.09	0.0001
Likelihood Ratio	16	12.00	0.744

ESTIMATES

VARIABLE	VARIABLE RANGE	ESTIMATE*	STANDARD ERROR	PROBABILITY
Intercept		1.459	0.134	0.0001
Income	< $10,000	-1.302	0.285	0.0001
	$10-20,000	-0.504	0.260	0.053
	$20-30,000	0.128	0.236	0.627
	$30-50,000	0.443	0.236	0.060
Age Category	23 - 34	1.801	0.276	0.0001
	35 - 44	0.197	0.232	0.400
	45 - 54	-0.573	0.259	0.030
	55 - 64	-0.637	0.300	0.034

* Estimate refers to the log odds of no major activity limitation while holding other variable constant.

APPENDIX D

TABLE D-3

LOGISTIC REGRESSION ANALYSIS OF CHRONIC HEALTH PROBLEMS FOR TCHS 1983 SAMPLE:

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	CHI-SQUARE	PROBABILITY
Intercept	1	218.39	0.0001
Income	4	14.18	0.0068
Sex	1	7.07	0.0078
Smoking Status	2	14.77	0.0006
Age category	4	42.59	0.0001
Likelihood Ratio	127	145.46	0.1255

ESTIMATES

VARIABLE	VARIABLE RANGE	ESTIMATE*	STANDARD ERROR	PROBABILITY
Intercept		2.037	0.138	0.0001
Income	< $10,000	-0.158	0.233	0.4970
	$10-20,000	-0.660	0.194	0.0007
	$20-30,000	0.059	0.231	0.7796
	$30-50,000	0.789	0.316	0.0126
Sex	Male	0.338	0.127	0.0078
Smoking Status	Current	-0.197	0.156	0.2061
	Former	-0.456	0.164	0.0055
Age Category	23 - 34	0.961	0.224	0.0001
	35 - 44	0.521	0.266	0.0505
	45 - 54	-0.007	0.250	0.9779
	55 - 64	-0.429	0.221	0.518

* Estimates refer to the log odds of no chronic health problems with all remaining variables held constant.